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J. H. KELLOGG, M. D.

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A TWENTIETH CENTURY DOCTOR .

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Good morning, Ladies and Gentlemen : I believe I promised to talk to you awhile this morning about the coming Doctor. There has been a great change in doctors within the last twenty centuries. About the first we know about doctors, is concerning the Egyptian physicians. The Egyptian physicians were priests and politicians, as well as physicians, for, among the earliest nations politics, religion and physic (as it was termed) or medicine, were closely intermingled. The rules upon which physicians practiced, were laid down so exactly, in the hermetic books of the Egyptians, and they were required to be so precisely followed, that if a doctor failed to follow those rules in the treatment of a case, and the patient died, the doctor must die too. It was rather a serious thing to practice medicine in those days,--it was about as serious as practicing medicine down among the Yuma Indians at the present time. I was down there some time ago, and there had been two Indian "medicine men" there, and there had many of their patients died, and they had to leave . Among the Yuma Indians, the doctor must predict what the result will be in each case,--he is obliged to say whether his patient will recover or die, as the result of his treatment. If the doctor says the patient is going to die, and he dies, it's all right; but if he says the patient is

going to die, and he recovers, it scores one against him. If he says the patient will recover, and he dies, that scores one against him. When he gets three scores against himself, then he has to die. Well, there were some 50 or 60 deaths under the treatment of these two Indian doctors, and they had many more than three scores against them, and the consequence was, that they were condemned to death, and they were obliged to fly for their lives; but through the intercessions of the missionaries (the Catholic Sisters), they had an opportunity to escape. But among the Egyptians (as I have stated), rules were laid down for the physician to follow, and if they varied from these rules and the patient died, the doctor died also. This was because the rules for the practice of medicine were supposed to have been laid down by the gods, and consequently they were infallible; and if the patient died when these rules were followed, it was because the gods intended it, and it was all right. If the rules are followed, and the patient recovers, it is all right then; but if there was any violation of the rules, and the patient died, then it was the fault of the doctor and not the will of the gods, and the doctor had to suffer death. As you may suppose, there were many scores of rules to practice. One of their most potent remedies, was, to dip the patient in the water in which an idol had been dipped (it was a sort of "holy water, I suppose .) and this water was supposed to be a panacea for all human ills. Many other very remarkable processes in the practice of medicine have prevailed

among the Egyptians. They had no hospitals; and it was a reflection against the practice of the priests (for the priests were the doctors) that the people sometimes preferred to submit themselves to popular notions among their neighbors, rather than go to the priests, and so, as they had no hospitals, the patient was taken upon one of the streets, and he asked the advice of every one who came along, and when he found one who had been sick in the same way that he had, and had been cured, he was doctored with the same remedy. This seems to be a sensible practice. That is what persons sometimes do now : if a person is sick, he looks around and finds some one who has been sick in the same way, and if he has been cured, he asks him what patent medicine he took, or what mineral spring he visited, or what it was that helped him. People have a great deal of faith in the experience of others, and if a man finds some person who has been sick in the same way he is, and has taken some remedy which has helped him, he has faith enough in the remedy to take it himself. I suppose that is where doctors often get their reputation: they find out what has cured certain diseases in certain cases, and they treat others in the same way. But, in those times the patient often required , not a doctor, but a change of air . . So you say we might there was irregular practice then, as well as now .

Among the Jews, the practice of medicine was somewhat similar to that among the Egyptians,--in fact it is quite probable that the Jews borrowed their ideas of medicine and sanitary science, in

some degree, from the Egyptians. "Moses", it is said, "was learned in all the wisdom of the Egyptians"; he was educated in Egypt when Egyptian knowledge was at its greatest height of excellence--in what might be called "the Golden Age of Egypt". Moses was brought up by Pharaoh's daughter, and educated among the most learned people of the world, at that time. But, in later times, we find, in the Talmud, the same practice of medicine set forth, as that employed by the Greeks, and it is probable that the Talmudist writers derived their knowledge of medicine mostly from the Greeks. The ancient Romans employed similar methods of practice in healing the sick, as that practiced by the Greeks. Magic and incentations were used as remedies,--for example, herbs were burned and brought to the patient and held to his nostrils and inhaled, and then carried away, supposing that this would persuade the daemon (who was supposed to be the cause of the disease), to depart. Sometimes the patient was flagellated with whips unmercifully, with the idea that the daemon might be driven out. Sometimes the patient was advised to visit the caves which were supposed to be inhabited by genii who had power over disease; and these genii would sometimes seize the man and throw him down and beat him until he was nearly dead, and his friends would rush in among the ogres and carry him out. If he survived the ordeal, he was cured miraculously. .

From those times, down to the present, I think we may say there has been continual progress in reference to the treatment of

the sick. The first intimation of rational medicine that we have in the history of medicine, we find in the writings of Hippocrates some three or four centuries before Christ. He was the first man who seems to have recognized the relation existing between diet and disease, and meteorological conditions and disease, and to have recognized the relation of habits, to disorders of the body. He was the first man who seems really to have understood what disease was; that it was not a living thing in the body to be cast out, but rather, a disordered action of the body. Disease in a man, as recognized by Hippocrates,--and as recognized by rational medicine in modern times,--is exactly like disease in a machine (a machine which is out of repair). Here is a threshing machine, or a printing-press, or a sewing machine, that is out of repair--out of order: it needs to have something done to it, to enable it to perform its work properly. That is a machine suffering from disease,--it is disordered in its apparatus somewhere. Now the human body, looked at from a rational standpoint, is a machine, an apparatus, a mechanism, ,by which certain functions are performed. When this mechanism is out of order, so that it cannot perform its usual functions, then it is diseased. And that is what disease is,--it is simply disorder,--a morbid action in the animal organism. Now this morbid action may be unnatural in a variety of ways: it may be an excessive action, or a deficient action,--and it may be no action at all . And there may be ~~a~~ some simple change in the function, or it may be a change in structure. We

see all grades, varieties, and modifications of the normal actions and functions of the body. All these deviations from natural conditions, are causes of disease--are conditions of disease. When we come to look at disease in this way, we must necessarily look at remedies in a different way from what we otherwise would. So it is very important for us to have a proper idea of what disease is. The modern physician has very different notions from those of the physician of a hundred years ago - or even twenty years ago, and the coming doctor, I think, will have a still clearer idea of the nature of disease. But I am sure that the practice of the future, and the management of disease in the future, will be based upon the idea that disease is not an entity, but simply a morbid action, --a disturbed condition of the body .

Now, looking at the matter in this way, the future doctor will treat disease in a very different way from that of the doctor of the past--as well as the average doctor of the present time. The doctor now inquires about the symptoms of his patient, and then he begins to give medicines to meet those symptoms. Physicians, many of them, care very little for the causes of disease,--for instance, the homeopathic doctor cares little about the cause of the patient's malady, but he wants to know what his symptoms are, because his practice simply consists in meeting symptoms; he knows more about symptoms, a great deal, than his "regular" brother (I don't know as his "regular" brother would like to be called a brother, there is such an antagonism between the two schools; there is but little fraternity

between them-) but the regular physician does not look so much at the symptoms, as he does at the nature and the general character of the disease. The homeopathic doctor only wants to know the list of symptoms of the disease that the man is suffering from, and then he begins to give his patient those medicines to cure the sick man, which will produce the same symptoms in a well man. There don't seem to be much philosophy in that, but the homeopathist assures us that it is the true principle. The regular physician finds a patient suffering from disease, and (as I believe) often ~~usually~~ treats the disease in a rational way; but the average doctor pitches into his patient, as though there were somet thing in the body which must be expunged from it,--as if disease were something to be driven out of the man. Now this practice sometimes results very unfortunately for the patient . The man who medicates symptoms only, leaves his patient in practicall ly the same condition day after day; he gives him something for a certain symptom today, and tomorrow he must have something for the same symptom, or some new symptom. There is really nothing done to remove the root of the disease. Now I am not saying that this is true of all homeopathic physicians, but it is a practice which naturally grows out of the homeopathic theory that "similia similibus curantur". It does not grow out of the theories of the "regular" doctor, as he does not subscribe to any particular theory; but his practice is (so far as there is there any rule about it), is, to attack the disease, and drive it out of the patient. Twenty five years ago, the practice was, to drive

out the disease by purgatives, bleedings, blisterings and various violent applications which would seem to be aimed at the disease, just as much as the flagellations and torturings of the ancient doctors were aimed at the daemons supposed to inhabit their patients .

Now the rational doctor,--the coming doctor, I think will treat disease in a different way --in fact he will not treat disease at all. When a man comes to him sick, he will not content himself with finding out the nature of the disease the man is suffering from, and then give him something which he supposes will cure the disease, but his anxiety will be to cure the man,--not to cure his disease. I may say, that it is an easy thing to cure a disease, and yet be doing nothing for the patient. I have known cases in which diseases have been cured, but the patients were left very sick. I have known repeated cases in which patients have been cured of disease, but in which the doctor cured the patient. A patient often says, "My doctor cured me of typhoid fever", or "he cured me of rheumatism," or "of my neuralgia, " or "of my gout". Now I don't think a doctor ever cured a patient in the world. Doctors do cure diseases. A man has a pain,--a dose of opium will cure that pain. A patient is suffering from nausea. Medicine will relieve that. A man is suffering from an inactive state of the bowels,--a purgative medicine may cure that state of the bowels for the time being. So remedies do cure symptoms, and do cure diseases, -there is no doubt about that.

But what we want, when a man is sick, is, that the man himself should be cured. Not long ago, I was reading of a case in which a man was cured of rheumatism,--he had been suffering from rheumatism for several weeks. The doctor had been in constant attendance upon him, administering one remedy after another, and, by and by he "cured the disease" (as he said), and though the disease was cured, the man died in three hours afterwards. The disease was cured, but not the patient . Now some of you have had an experience of that kind many times. You have visited your doctor and said, "Doctor, I am bilious,--I want something for my liver". Well he gave you something for your liver, but it didn't cure you,--except for the time being,--because you had to go to him again with the same complaint--your biliousness. Some years ago I had a visit from a gentleman who was at that time Governor of the State. He had been troubled for many years with the gout. There was no wonder that he had the gout, for he had been a high liver. He was just coming back from a great dinner in Chicago. Some of you remember the great dinner given to Gen. Grant on his return from his trip around the world. There was a great dinner in his honor, and some of the notables were present , among whom was the Governor of our State. I think the dinner lasted some four or five hours. Well the Governor stopped here, on his way back to see some friends in the city, and came up to see the Sanitarium, and while chatting with me a little while, he said,

"Doctor, I wish you would tell me of something that will cure the gout. I told him there were several things that would do it . "Well" said he, "tell me one ". I said, "The best thing to be done, is, not to cure the gout, but the patient ." "What do you mean"; said the Governor . "I mean, stop doing those things that have produced the gout, and do nothing that will cultivate the gout; I notice you smoke, and that cultivates the gout: If one will stop cultivating the gout, nature will take care of the gout, and will cure him--provided he will take care of his habits." Said the Governor, "That's a new idea;--but it isn't so easy to do that. I am very fond of smoking,--and, I must confess that I am pretty fond of good dinners--and I have just been down to Chicago to a good dinner; but I carry a little box of these "colsicum ?pills" (taking them out), and I take them to mitigate the gout, but they don't do me as much good as they used to.--By the way, I don't have much faith in you doctors, anyhow: I called on a doctor in Detroit a few weeks ago and told him I wished he would give me something to cure this gout; that it troubled me so much that I couldn't go out to dinner and couldn't enjoy meself at all without having an attack of the gout. If I do try to enjoy myself in this way, these pains come on, and more than antidote all the enjoyment. But I don't like to give up my social pleasures. So I went to see this doctor, and after talking with him a little while, he gave me something that he said he thought would benefit me. So I took the prescription and started for the drug-

store with it, to have it put up. After I had got a few rods off, I heard the doctor calling me,--"Helloo, Governor ! Come back a minute". So I went back to see what he wanted, and he says, " I just wanted to say, if that medicine does you any good, I wish you would let me know, for I have got the gout too." So I threw the medicine away. Since that time, I have not had much faith in you doctors." Now if that is the way the doctor practiced medicine, it is no wonder his patients have no faith in him. But I told the Governor, that it was not the doctor, but the principle upon which he administered medicine, that he should have no faith in; that he should not have tried to cure the gout, but to remove the cause of the gout . Now it is a very easy thing to cure symptoms; it is an easy way to practice medicine,--simply to practice according to the symptoms--to make a prescription according to the symptoms : if a patient has a pain, give him an opiate; if he has a distress of any sort, give him a remedy to remove it; so that symptom is removed, and the patient feels happy right away. If the patient is weak, give him a stimulant or a tonic. You say to your physician, "Doctor, I feel weak." He gives you a prescription of "wine iron and strychnia". What does that mean ? It means stimulation; it is for the purpose of quickening up your nerve - centres , so that you will do work that you are not able to do .; it means that you are swallowing a poison into your system to make you feel better, that does not do you any good. You don't sleep well, and you say to your physician, "Doctor , I want some thing that will make me sleep." Just

think of that expression,--what does it mean ? It means that you want something that will stupefy you,--something that will knock you on the head so hard that it will paralyze you; you want something that will strike such a blow on your brain, as to paralyze you and make you unconscious for a while. A nervine,--a narcotic— puts one to sleep simply by benumbing his nerve-sensibilities. Your nerves are so sensitive that yourbrain keeps crying for rest,, and you can't get quiet, and by the doctor's prescription, you take a large dose of bromide of potash or chloral,--or any other of the hypnotics which are so commonly used, and then you go to sleep. Now what is your condition in sleep ? It is simply a condition in which your nerve-sensibility is lessened, and, for the time being, you can sleep. Some years ago, when I was studying throat diseases, I noticed that the doctor used to give his patients large doses of bromide of potash before operating in their throats with a mirror. Patients used to give us a good deal of trouble while we were inexperienced and awkward in holding the mirror in the throat, and we would irritate the throat and the patient would gag and cough, so that it was very difficult for us to look into the throat ; so the doctor always gave the patients several large doses of bromide of potash, commencing two or three days before examining them. I asked him what he did that for, and he said it was given so that the nerves of the throat would not be so sensitive. So , when a person takes this bromide of potash , it is not only the nerves of the brain, but the nerves

of the throat, stomach, liver,--every nerve in the body has its nerve sensibility lessened. When we say the nerve sensibility is lessened, we mean that the nerves are in a state of partial paralysis. That is true of everything which obtunds nerve-sensibility—is a paralyzer,--and if you take enough of it, it will kill you.

Some years ago, a lady came to the Sanitarium for treatment. When she started to come here, she was carried to the train and put on the train by her husband and her doctor . I think she had been here only two or three days, when she was walking all over the house. She had heard me give a talk, in which I explained the effects of bromide of potash,--that it paralyzed the nerves which control the muscles of the legs, and, these nerves being paralyzed, that the patient could not maintain their equilibrium, and couldn't walk straight, etc. This lady, after hearing me talk on this question, says, "I understand now why I got well so quick after I came here. I hadn't been able to stand on my feet for three weeks, and I hadn't been here three days before I could walk. My doctor gave me some bromide of potash, and told me when I was nervous, to take a dose,--and I was nervous, and I took a dose, and my nervousness increased, and I increased the doses, until I took a tea-cup full every hour or two, until my nerves got so paralyzed that I couldn't stand alone. But when I came here, I left my medicine, and after three or four days, I was cured,--but it wasn't your treatment that cured me." Now the

lady was sick and nervous, and the medicine cured her nervousness; but, you see, she had acquired a disease which was worse than nervousness. Prof. Liebig, the great German chemist, wrote, in one of his books more than half a century ago, "We cure disease, by producing new diseases. When a patient is suffering from one disease, we give him a medicine producing another disease, and that's the way we cure him." That is true. The drug which is given to cure a disease, produces disease just as much as the morbid state of the system for which the drug is given, is a disease. So, when we treat disease, and cure disease, we do it by substituting one morbid condition for another. For this reason, that method of practice is unphilosophical,--it is really unscientific. It is just as absurd as was the practice of the ancients which I have just described to you.

Now the future doctor (as I have said), it seems to me, will aim to cure the patient, and not to cure his disease,--not simply to relieve his symptoms. It will, I think, be understood that the patient is the one to be cured, and not the disease. I have said (and I don't know as it is unreasonable), that "Cured to Death" might be appropriately written on many tombstones-- I don't know how many, but I think thousands of people are cured to death every year. The number of people who are cured to death by patent medicines must reach a good many thousands. The number of persons cured to death in a regular way, and in an irregular way, must certainly be many thousands more; and it is simply because

doctors are all the time treating disease, and treating symptoms, without any regard to the patient. When a man was suffering from a fever, for instance, the old fashioned way was, (as I have said), for the doctor to pitch into the disease, and then there was a pitched battle between the doctor and the disease, and the patient was the battle ground of the combatants--the disease on one side, and the doctor on the other , and when the conflict was over, the poor patient left in a torn-up condition,--in a similar condition to that of some of the battle-fields of the South during the rebellion. Some years ago, I visited some of the battle-grounds in the vicinity of Richmond, and I saw trees with their tops cut off, houses riddled with bullets, and in some places, where the conflict had been thickest, rows of great trees had been mowed down by cannon balls and shells. "Now," I thought, "How much that looks like some patients where the doctors and disease have been fighting their battle,--and between the doctor and the disease, there was but little left of the poor patient. Now (as I have said) the rational doctor,--the coming doctor--will be likely to look at this matter in a more rational way. It is only the doctor who practices medicine "according to rule", who fights the disease and treats the symptoms,--he doctors by rule, the same as the ancient Egyptian doctors who followed their books exactly . One of this class of doctors finds his patient suffering from some disease--rheumatism, for example; he looks into his books, and he finds at the head of the list of remedies for rheumatism, "Sallicylate of Soda, " and he gives that. If that does not cure the

patient, something else on the list must be given--sala, for instance. After a while the rheumatism becomes chronic, and he gives him iodide of potash, and so on. The more remedies we find prescribed for a disease, the more certain you may be that the disease is incurable by any remedies of that sort., and the more certain you may be that those remedies have very little value in such a case. Because, if any single one of them were valuable, that remedy would have been sufficient. So, when you have a long list of remedies for a given disease, you may be sure there are none of them good for anything, for, if there had been, that one single remedy would have sufficed.

Now, in the future, when a doctor finds a man sick (and some doctors do it now), he will inquire of the patient, "What have you been doing that has made you sick?" and the man will have to give a strict account of himself,--as to what he has been eating, what he has been drinking, what he has been doing, how much exercise he has not taken, and how much dissipation ~~there~~ has been:-- he will have to give a thorough account of himself; and when he has done that, the doctor will find it very easy to solve the riddle as to what has made the patient sick. Disease is the consequence of a sin against the body, where a man has no hereditary disease,--for it is a sin to be sick when we can be well. It is a shame and a disgrace and a discredit to a man to have the sick-head-ache or to have a bilious attack. I think a man that tells lies or steals is not much more immoral than that man who has bil-

ious attacks every now and then.,--I really think so. If a man has bilious attacks, it is because he has been guilty of gluttony, or something else; if he has bilious attacks once a week, he has been gluttonous. I remember of a clergyman who used to have a bilious attack every Monday morning, and he didn't know what did it (and I have met many others in the same way), and I asked him what he thought was the cause of it . He said he thought it was the Sunday's sermon that caused it. I said to him, "I have met a good many farmers who are troubled in the same way, so I don't think it was the Sunday sermon." I don't know but I was impertinent, but I finally asked him what he had for dinner on Sundays, and I could easily trace the bilious attacks to the "good things" he had had for his Sunday dinner. Many people seem to think it a particularly pious thing, to have"something good"for the Sunday dinner. Some people don't like to be questioned in reference to their pet sins; and for this reason, medicines are advertised in the newspapers, warranting to cure dyspeptics without any attention being paid to their diet. Such medicines are very popular, and many people are very willing to take them .

Sometime ago, I was talking to a man about what he ate, and what he should do to recover health. I observed, for some time, while talking to him, and advising him, that he didn't pay any attention to what I was saying, and when I called his attention to it,--"O" said he "I haven't time to attend to all that; give me

something to swallow that will cure me ." He wanted to be permitted to go on in his bad ways, and be cured by swallowing something. That is the way he had been brought up. So he thought, if he would go to the doctor, and the doctor would give him something to swallow, he would take it,--he had been treated in that way, and he thought that was the way he would be treated here . I told him there was no use in treating him the same way he had been treated at home, for, if that method had been successful, he would not have been here,--said I, "This institution is for the purpose of working on a different principle from that by which you have been treated at home: our principle here, is, not to antidote diseases, but to cure sick people". And the principle which I believe is growing in the world, and which is going to be the principle of the future, in the practice of the physician, is that the sick man shall be educated into health, and educated out of disease. I think that will be the radical principle that will be followed by the physician of the future; that the treatment of disease will be a process of education,--a process of training. Now suppose your boy stutters or stammers (stammering and stuttering are a little different), you wouldn't send that boy to a doctor and say, "Doctor, won't you give this boy some medicine to cure his stammering?"--you wouldn't think of such a thing. You would send him to a voice-trainer, and ask him to train that boy into habits of correct speech. Now suppose, if you please, the boy's stomach stammers (for indigestion may be considered as a sort of stomach stammering). What are you going to do with that

boy ? Would you take him to a doctor and say, "This boy's stomach is out of order,--he is bilious; now give him something to swallow? " Tell me, how that boy's swallowing something would make his stomach do its work properly . Swallowing something wouldn't do it, any more than it would make his tongue do its duty, instead of stammering , (for they are really of the same nature). Suppose a boy "toes in" when he walks. When one turns his toes in, instead of out, he does not walk carefully, and stumbles How owuld you cure that ? You wouldn't think of asking the doctor to give him ointments or liniments to rub on his feet to make him turn his toes out; and you would not put blisters on his feet to cure him of the habit of toeing in, but you would send him to a gymnast, and you would expect the gymnast to train him so that the rotary muscles of the leg which turn the foot out, will be stronger, because the muscles that turn the feet in, are too strong for the muscles that turn them out. The muscles that rotate the limbs outward should have exercise. It is necessary that the muscles of the hips, that turn the limbs outward, should be stronger, so that they will turn the feet in the proper direction. Now suppose, ~~instead of toeing in,~~ this boy gets bilious, a bad taste in his mouth, his tongue gets coated, his eyes get dingy or yellowish, his skin gets tawny, and he gets in that condition which every one recognizes as that of a torpid liver. Will send that boy to a mineral spring, or send him to a doctor for a dose of blue mass, or some similar remedy, to regulate his ~~stom-~~

liver. Tell me how medicine can regulate his liver, any more than medicine could regulate his feet. It is just as impossible for medicines on the inside of his liver to regulate his liver, as it would be for liniments or blisters or ointments on his feet (or ~~medicine~~ in his feet), to regulate his feet. Now it does not seem so impossible to cure these internal organs in this way, as it does the external; because they are inside of the body, and they are a mystery to us, and we don't try to understand the philosophy of the cure or the treatment of these internal organs. They are out of sight, and because they are out of sight, we think it is impossible to understand anything about them,--just because they are out of sight you will believe any sort of nonsense or moonshine about these internal organs. The liver is a gland weighing about 3 1/2 pounds, and the anatomist understands its construction and arrangement, just as well as he understands that of the tongue or feet. And the same principles that apply to one apply to the other. The same common sense relating to the treatment of the one relates to the other also. How is it possible, then, that we should administer medicine that will regulate the liver any more than we can administer medicine that will regulate the feet? A certain quack doctor explains how his medicines help the lungs, in this way: Some one asked him, "How is it that swallowing your medicines into the stomach helps the lungs?" "Well there are two roads to the stomach,--one road leads right down into the stomach,-that's where the food goes down; then there is another way, which is the roundabout road and goes through the

lungs. Now my medicine has the wonderful faculty of selecting the roundabout road to the lungs, and when it gets there it stops there and it does them good." Now that is not the way it does,--the medicine does not stop at the lungs. It travels all through the body,--it goes to every cell in the body.--the brain, the feet the lungs and the heart--just as much as it does to the lungs or liver. How then is medicine to have such a wonderful effect as is claimed for it ?

The whole philosophy upon which medicine is generally administered, is a false one It is usually administered with the idea that medicine acts upon the body,--that it does something to the body--which is entirely a mistake. Really, the body does something to the medicine. Suppose I take a stone in my hand and toss it away from my hand : would you say that stone did something to my hand ? My hand does something to the stone, as I toss it off. Now suppose I take some medicine into my stomach, and then vomit it up : the stomach throws the medicine out, just as my hand threw the stone away . Now is it the medicine that acts upon my stomach, or the stomach which acts upon the medicine ? It is the same thing in one case, as in the other . It was my hand acting upon the stone, and it is my stomach which acts the medicine . Suppose there is a liver trouble, and a discharge of bile,--the patient takes a cholagogue, and there is an increased discharge of bile : does that medicine act upon the liver, or the liver upon the medicine ? Suppose I take a diaphoretic (a medicine that makes one sweat). It makes one sweat, but it is in

the same way is thrown away from my hand. When I take this diaphoretic into my body, the skin-glands find it in the blood, and they don't want it, and so they throw it out by perspiration,-- in other words, these glands act upon the medicine . And so it is with all cathartics, cholagogues expectorants and all the medicine which is claimed to act upon the body . There are none of these medicines which act upon the body but body acts upon them. So you see how impossible it is that this should be the true philosophy of medicine (although a philosophy which generally prevails in regard to the use of medicine), that it acts upon diseases upon the organs, upon the body. It is a false philosophy, --the whole thing is based upon a wrong principle . The true principle is, that the organs of the body act upon medicine, and the results attributed to medicine should be really attributed to the body itself.

Now the future doctor, I think, will think and act along this line, and when he finds a patient, he will begin to study the patient. He won't begin to medicate him,--perhaps he won't give him a drop of medicine at all, but will perhaps give him a good scolding for his abuse of himself, and give him a stirring exhortation as to how he should relate himself to the laws of health, and as to what he should do, by this means showing him how to grow out of his disease and grow into health. He will give the patient the necessary process of training by which the poor broken down worn out stomach can be trained into a condition of healthy ac-

tivity. But the patient cannot be medicated into such a state . What do you give him medicines for ? For two purposes : to palliate the symptoms, while nature is doing something for the patient and to help the patient's mind. When the patient's mind is so full of false philosophy that he does not comprehemd--does not really come into the practical application of the principles that I have been outlining to you--then it is necessary to keep the patient under control long enough for nature to do something for him. While the patient is being trained up into a state of health, it is necessary to keep him quiet,--because, if he runs away off a thousand miles, you can't do anything forhim; but if he has the back-ache or the stomache--ache, and wants to get rid of it right off, and the treatment that he is receiving is gradually getting rid of and removing the causes of the trouble (and nature is assisting, so that by and by the symptoms will disappear), but he wants to get rid of it right off; so the patient says, "Now, Doctor, I want something to swallow (I have been used to swallowing something ~~something~~ for my complaints), it seems to me your method is slow, and I want something quicker,--I want to be relieved right away." So we give him something to swallow that will relieve his symptoms, so that he will feel better and have more confidence and be more comfortable, and we give him something to relieve him that will do the least harm to him . Here is a person suffering from malaria,--he has a fever, then a chill, and then a sweat. The next day he goes through the same

rotation. Now the patient can be cured without quinine by a process of treatment which will by degrees break up the periodicity of the disease .--At one time I treated thirty cases of malarial fever without giving a drop of medicine, and cured every patient within two weeks of acute malarial disorders, and the chills were broken up, in most cases within three days, and not one of them had a drop of medicine . This was an experiment that I was trying, in regard to the necessity of the use of medicine in such cases. But I find, now-a-days, that patients have so little faith in rational methods of treatment, that they must have something that will produce immediate effects. So I almost always give them an anti-periodical dose of quinia, and then I treat him with a view to curing him of both his quinia and his malaria. But that way suits the patient best,--although it takes a little longer to cure them when the patient likes that plan the best--but I let him have his own way.

But the doctor of the future will do the right thing, and I hope the people will be educated to such a degree, that they will let the doctor do the thing that is really best for the patient, and not set up his own ideas or following old superstitious notions to such a degree that the doctor's hands will be tied so that he cannot do what he would like to do. But the principal work of the future doctor , I imagine, will be to keep the people well, rather than to cure them when they are sick; to aid them in k eping well, by educating them in right habits of life. I think

the coming doctor will be invited to call around once a week or once a month, to look over the premises, and see if there are any causes of disease,--possibly the doctor will be paid so much for keeping a family well, instead of curing them when they are sick.

Our present system of medical practice is unphilosophical . At present, it is for the interest of the doctor to keep the patient sick,--doctors are really bribed to keep their patients sick, by the present system. I have heard of a doctor's really giving some back-setting, but I don't believe it. I heard a story of a doctor who went off on some business and left his medical student at home. But the medical student didn't understand much about medicines, and couldn't give many prescriptions, and the consequence was that the patients all got well during the doctor's absence. By the time the doctor got home, he hadn't a single patient left, and the young student thought the doctor's practice was ruined when he returned. But the doctor said, "Never mind; we'll soon have business enough". So he took his student in his carriage with him, and they started off into the country. By and they stopped at a house and the student inquired, "Is there any one sick here" ? "No" said the doctor," But there will be ." Then they drove on until they came to a house where the doctor was acquainted. Then they stopped and when they went in , the doctor said, "Good morning Mrs. Jones. I was just going by to see a case, and I thought I would just stop and see how you were getting along .--Why, Mrs. Jones, it seems to me you don't look

quite as well as usual,--let me see your tongue". So she puts out her tongue, and--"Well I declare ! Your tongue is dreadfully coated,--I believe you are coming down with the fever--let me feel your pulse". So he feels her pulse. --"As sure as the world! I was just in time,--you are just coming down with a fever ! How fortunate it was that I happened to drop in just as I did. I don't know just what made me call,--I thought I would drop in as I was going by--but it is very fortunate, and you must have some medicine." So Mrs. Jones takes a dose of quite vigorous medicine. The next day when the doctor called, she was really sick, and took some more medicine. The next day she was sicker still, and had to go to bed. But, by constant attention on the doctor's part for a week or two, she began to convalesce, and finally recovered, and ever after, she felt very grateful to the doctor for saving her from a long run of ~~the~~ fever. Now I think that must be a very exaggerated case if it is true,--and I don't know as it is really true--but I have known of cases that I think were pretty nearly like that . But you can see how medicine is practiced at the present time: Doctors are paid only while the patient is sick, and the consequence is, that it is for the interest of the doctor to encourage people---to be sick ! It should not be for the in the interest of the doctor to encourage people to be sick,--although I am glad to say that I believe the profession is made up of men who are sufficiently high-minded, so that such motives very seldom prevail . However, I met a

doctor a while ago in a neighboring State, and I said to him, "Doctor how are you getting along ? I suppose you are prosperous as usual ?" Well he said, "Now to tell you the truth (of course this is confidential), we are having a dreadfully healthy time. It is too healthy,--it's so healthy that I am afraid the doctors will starve." Don't you see the situation ? Suppose that 20 doctors in a certain town should combine together to keep the people of that community healthy, and they should look after the sanitary condition of the city,--the water, the sewers etc., and no one pays them, and every one gets well. How would the doctors live ? We certainly ought to reverse this thing, and pay the doctors for keeping us well, instead of paying them while we are sick. Some people treat their lawyers in the same way,--paying them only while they are engaged in law -suits.

But we find that better ideas are coming to prevail, and people are finding that there is a better way. There are some prominent business men and firms and companies who do not pay their lawyers simply while they engaged in actual litigation. there are a great may people who hire lawyers and pay them salaries to keep them out of litigation. Every great corporation now- days, employs a lawyer,—and what it is the duty of that lawyer ? Not to make business for himself . On the contrary, it is for the interest of the lawyer, while he is paid so much a year by the railroad company or the manufacturing concern which employs him, to keep them out of litigation as much as possible , and if they are

threatened with a lawsuit, to settle in the cheapest possible way, and it is his duty to so guide them that they wont get into litigation and keep them out of the courts as much as possible. Now the same thing is coming about already among the doctors to a certain extent,--in fact, it is said that in China, the doctor is only paid while the patient is well, and if the patient dies, sometimes the doctor's head comes off. Now in England, they have a great many large associations--"guilds" as they are called; and it is the practice of each guild to hire a doctor, and it is his duty to care for all the members of the guild without compensation. Associations are being formed in this country which pay a doctor for keeping each of the members of the association well or to take care of them when they are sick. A member of the association pays $5 or $10 a year, and if he gets sick, he ~~must~~ is to the hospital to be taken care of. Now you can see that it is for the interest of such an association, that its members should keep well, if possible. So these doctors do not cultivate sickness. When a member of the association gets sick, he must go to the hospital to be taken care of, and he is expected to be cured as quickly as possible. It is for the interest of the association that this should be done, for the purpose of saving expense. I think I wouldn't care for any more lucrative business than just that sort of business. I would like to organize a Health Insurance Company, and agree, for so much, to keep the members well. I think I could make a very safe enterprise of it in this way. We could say to a man, "we will

agree, for the sum of $5 a year, to keep you well or take care of you if you are sick; but you must not use intoxicants, tea, coffee, nor tobacco, and you must not do this, that, or the other thing" (laying down certain rules for his guidance)." Now, if you will abide by these rules, and pay us $5 a year, we will agree to keep you well; if you violate these rules, you will forfeit your contract." I believe this would be an excellent means of health reform. If people knew, by paying a small sum, and doing certain things, that they would be kept well, and if the enterprise was conducted on a business basis, I have no doubt thousands of people might be drawn into such an association, and that this might be an efficient means of reform.

The doctor of the future, when called to visit a sick family, will be expected to look into all the surroundings pretty carefully; he will inquire about the hereditary tendencies of the patient. He will be asked by the father and mother of the child, "What shall we do for this infant so that he may avoid the tendencies which he has inherited"?--perhaps the father will say, "I have a tendency to consumption"; while the mother perhaps will say (as many can truly say) "I have abused myself so much that I have a torpid liver. Now, how shall we raise this child in such a way as that the traces of these diseases shall be obliterated?" And the coming doctor will show them how this may be done. Here is a child with a hollow chest which he has inherited,--what shall be done with him? It will be the doctor's business to point

out what he must do,--and the works of supererogation which the child may do, so that he shall atone for the sins of his parents. By such methods, the race will be continually improving, instead of deteriorating. The doctor of the future would be called upon to visit the schools, and look after the sanitary conditions there, and while the teacher prescribes the mental training, and the preacher prescribes the moral training, the doctor will be expected to look after the physical condition of the people in their homes, ~~and~~ in the schools, etc.,and the sanitary commissioner will look after the sewers, the condition of the water supplies, the streets, &c.

See how blindly we go on at the present time ! We think nothing of these things until we get sick,--and even when we get sick we pay no attention to these sources of disease, and let all the members of the family get sick. I knew a case not long ago, in which a man got sick of typhoid fever, then his wife was taken sick, and then one of his children was taken down,--until all the members of that family were sick with typhoid fever--and it all came from the well. It seems that a neighbor had been away and he got sick with typhoid fever and he brought it home with him and went into the vault, and from there it found its way into this well, and so, one after another of this family got sick and died from the use of the water of this diseased well. You have some of you known of such cases at home : One of your neighbors had the typhoid fever last spring . When the ground thawed out

and the contents of the cess-pool soaked down into the earth into the well (perhaps it was a joint well) and one of your neighbors got sick from the use of water out of this well. No one had warned them of the danger, and so they went on using this water and they got sick, because no one had put over it the placard "Death In The Well" ! Now that is what is often done. It will be the duty of the future doctor to look after such matters,--to educate the people, and warn the neighbors, in such a case as I have just described, and instruct the people in matters of health. I think there is a time coming (and I think I can see the evidences of it), in which we will have associations employing a doctor to take care of the members of the association at so much a year, and it will come to be for the interest of the doctor to keep the people well, so as to save himself as much work as possible .

Now there is a particular thing in which I think the practice of the future doctor will differ from the practice of the present doctor. The doctor of the present time unwittingly cultivates disease by his manner of examining his patient : He calls to see the patient; he feels his pulse; puts on a long face,--for it is necessary that the patient should think his case is serious--even if he isn't very sick--because the doctor wants his visit appreciated, and he wants his patient to be willing to pay his bill--which he might not be willing to do, if he felt that the

doctor didn't think his case amounted to much. One of the mottoes of the old Egyptian physicians was, "LOOK WELL TO YOUR PAY "; and that is one of the principles of the doctor of the present time. He thinks if the patient does not value his services very much, he will not be willing to pay well for those services,— that he won't be willing to pay his bill. So (as I have said), when the doctor examines his patient, he puts on a long face, and looks serious,--he looks so solemn that the patient thinks it is a serious matter. After counting off the pulse he asks the patient to let him see his tongue; he examines the tongue,--notices all the little red spots and all the little white spots and all the rough spots--and makes a note of it all; perhaps he takes out his note-book and writes down as many things as he can find about his patient's case to write about, and the patient by this time, is particularly impressed--especially when the doctor applies the stethescope and listens to the little sounds of the heart. (A boy told his mother that it made him feel "awful solemn", while the doctor was in this manner listening to the "pit-a-pat", pit-a-pat" sounds of his heart .) Then the doctor will ask his patient, "How does your stomach feel? How is your liver?Do you have pain in the back of the head ? Do you have specks before your eyes? Do you have a bad taste in your mouth?"-- and so he goes through with his long category of symptoms--many of which the patient never dreamed of --but to some of the questions he answers "Yes", and to some of them he answers "No". But to the question to which he answers "No" to today, he will very often

answer "Yes" to, tomorrow, because, after the doctor has gone, and he gets to thinking of the questions and the way he answered them, he will find that he had forgotten some things and that he should have said "Yes", when he said "No". Many times patients have said to me something like this :"Doctor, I told you yesterday that I didn't have a pain in my back,--but now I remember that I do have pain there." I suppose that has occurred in my experience a hundred times or more. Now (as I have said) we set the patient to thinking about his symptoms,--he gets to thinking about his stomach; ~~and~~ he thinks about his liver; he thinks about his nerves; he thinks about every sensation of his body, after the doctor has examined him and he is left alone, and he begins to wonder,--"Now do I have these 'tingling sensations' that the doctor asked about; and do I have these 'numb sensations', or don't I?--They may be very serious symptoms,--and, come to think of it, I believe I do have them every day." We ask a patient about his symptoms, and he will often say, when we see him the next day, "Now doctor, I told you that I had no numbness,--but now I remember that I have several times waked up in the night and found myself paralyzed from head to foot--I didn't think of it yesterday, when you asked me about it ". A patient told me that, and I had the hardest kind of work to convince him that it was not paralysis at all, but the result of pressure by sleeping on ~~that~~ one side. Parents and neighbors will cultivate disease in a similar way. A lady will come come in to see ~~another lady~~ a neighbor who is sick, and--"Well, poor

dear, how are you feling?--Isn't your head feeling any better ? Isn't your appetite any better? Didn't you sleep any better?" So the neighbors come in to sympathise with the patient and make him worse,--and it is a wonder that the man ever gets any better. It is only when he gets into the hands of a doctor who knows better than to cultivate these symptoms by calling the attention of the patient to them,--or perhaps he has a sensible father and mother who know enough to drive away some of these ghosts of disease, and to talk about something else besides symptoms. I remember a very serious fault that I committed some years ago,-I shall be careful and not repeat it: a lady whom I had been treating, complained of a pain in her side,--she had been thinking about that pain for several years and applying all sorts of remedies for it, but she was no better . By and by, by some means the pain disappeared, and for a whole week she didn't say a word about it ,--hadn't thought of it . I had made up my mind before, that it was a mere ghost of a pain and not a real pain, and now I thought I might convince the lady of it . So I said, "I notice that you haven't said anything about that pain for several weeks,--I guess it must be cured." She looked about the room a moment, then put her hand up against her side,--"Well, I declare!" said she,"It's there yet.--it is just as bad as ever it was ." Now she had been telling me several weeks before, that it was gone, and for the last three or four weeks hadn't said anything about it ,--and now I had resurrected it myself, and she went away with that pain and didn't

get rid of it. She had forgotten it entirely, and if I hadn't resurrected it, she would not have been troubled with it again.

I think that some time in the future, we will be able to examine our patients without asking them so many questions ; we will find out their condition by some physical means,--by examining the excretions, by microscopical inspections and by other means which will not attract the attention of the patient to it, we will find the bottom facts of the disease without saying anything about the symptoms. We will regulate his bowels and his diet, and by these and various other measures, we will help nature to cure the man, and educate him up into health. We will cure him,--not by medicating his disease, but by gradually raising his vital status until nature is able to cope with the disease and regulate all the vital functions.--But my watch has stopped, and I guess I will stop too.

SANITARIUM LECTURES . (Oct. 16,1891.)

J. H. KELLOGG, M. D.

H O W N O T T O T A K E C O L D .

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A "cold"(as it is ordinarily called) is a very serious matter. Many very serious chronic diseases, pneumonia for instance, may be traced to a cold. You ask a person suffering from one of these diseases, "How did your trouble begin?"--"O" he says, "I took cold; I thought it going to be only a cold, and so I didn't pay any very particular attention to it , but I kept taking more cold day after day, until I find myself really sick." The same thing is true in reference to consumption,--a patient often traces this disease to a cold. He often knows just when he took the cold from which his disease gradually developed. The same thing is true in reference to rheumatism,--in the first place, the patient takes cold.

I have observed the very same thing in reference to acute diseases, also,--typhoid fevers , malerial fevers, etc., especially with malerial fevers.: large numbers of persons suffering from malarial fevers, are able to trace the beginning of their disease to a cold . So we must regard a cold as really a serious matter. If a person takes a cold, he should consider that that cold may be the foundation of almost every disease. The condition of a person who has a cold, is that in which the defenses of

the body are lessened. Here, if you please, we have a fort or citadel surrounded by a wall, and fortified with buttresses and everything necessary for defense. The persons who are inside feel perfectly safe, because they consider that their defenses are equal to any emergency which may arise, or any attack that may be made; that no enemy has guns big enough to send balls sufficiently heavy and with sufficient force to destroy their walls and break down their defenses, so they feel perfectly safe. Now suppose it happens, by some accident,--perhaps by some excavations beneath the walls, or by the working of water or of animals underneath, there is a gap left in the walls,--the enemy might walk through there, and so, a guard must be placed at that gap until it is repaired. Now nature has given us ample defenses against our physical enemies; we have a skin which is impervious to germs; we have a mucous membrane lining the inside of the body which is impervious to most germs,--all the interior of the body and all the internal organs connected with the outside of the body are lined with a mucous membrane. Every single organ which communicates with the outside, is lined with a mucous membrane, and this membrane is impervious to germs. So the body has abundant means of defense against these enemies. There are other means of defense in the body. The tissues all contain active living cells, every one of which is a sentinel endowed by nature with the ability to destroy germs. All these cells contained in the body are active and vigorous, and possess the ability to kill germs; they capture germs,

kill them and digest them; so they are called micro-phagi, because they have power to eat up these small organisms. Now these cells are able to do their work under ordinary circumstances--when we are well- and able to defend us against these morbid conditions which we are likely to encounter.

But, during the existence of a cold, this condition is changed. When a person has taken cold, the functions of the skin and the mucous membrane are interfered with. We recognize that, in the fact that when a person takes cold, he begins to sneeze. This sneezing is due to a congestion of the mucous membrane.--its cells are clogged and a congestion, and this sneezing is an effort of nature to expel an imaginary something; there is a tingling there and a tickling--a feeling something similar to that produced by placing a feather to the nose, or an irritation from snuff, or any substance which will cause one to sneeze. Now, in consequence of this condition which a person is in when he has a cold, the skin lessens its activity,--it becomes morbid and not able to defend itself--but further than that : these lining cells within the body--cells that are found in the mucous membrane, and in the skin, and the cells lining the lungs--are more or less paralyzed by the condition of a cold, and thus their ability to defend the system is lessened.

Now (to illustrate this Point a little further) suppose I should interject underneath the skin a few germs,--probably there would no harm come from it A small number of germs would do no harm . Why ? Because the cells underneath the skin are able to

defend themselves, and the small number of germs interjected, would be destroyed. But suppose I should bruise or tear the tissues of the skin and paralyze the cells,--the cells are now injured and no longer able to defend themselves. So there is nothing to prevent the ingress of germs at that point, and they live upon these dead tissues, develop and multiply, and very soon we have a very serious condition induced; we have an accumulation of things which will produce a startling effect. Then we have an abscess of purulent matter present which is found swarming with germs--there is pus there, and it is all alive with germs. At the same time these germs produce poisons which are absorbed into the system and produce a fever and an abscess. Now, in a state which is caused by a "cold", the system is prepared for almost everything injurious. There is a febrile condition produced as the result of this action of germs, and this condition prepares the way for almost any disease; it is for that reason that when a person takes cold, we are subject to these germs of consumption, -and we are all taking in these germs here in the cities,--we cannot go into a hotel or any crowded assembly that we do not take into our lungs the germs of consumption, pneumonia, diphtheria, probably, and the germs of many other diseases , and the reason we don't all suffer from the action of these germs, is, that our bodies can defend themselves. Now, a person is taken down with consumption, it may be that he has been more than ordinarily exposed to cold, and it is probable that his system has got into a susceptible state,

these germs to which he is always exposed, have found a lodgment in his body, and have not found there the activity of cells sufficient to destroy them, and they have grown and developed, and the disease has become "seated," as we say.

Now a cold is one of the ways by which a person is brought into this susceptible state when a person takes in these germs which are ordinarily destroyed by the cells . . But the germs of pneumonia are found in the mouth all the while; the germs of consumption are frequently found in the mouth, and the germs of diphtheria also are found in the mouth . These germs do not give us diphtheria or pneumonia because the cells destroy them; but in the state of a cold, they get so good a start, that the system cannot defend itself, until they have run their course and the crop of germs have exhausted the soil upon which they grew. Then (as I have said) we see that a cold is a very important matter, and when a person finds that he has taken a cold, he must give serious attention to it ,--but a person should not take cold.

You see how important it is that we should not take cold; because when we do so, ~~and~~ we are ~~in~~ a susceptible state, we are liable to take anything. The best way not to get consumption, is to keep one's self proof against consumption, and then he can keep himself proof against disease, by obeying the laws of health ~~and~~ by keeping his blood pure; by keeping his skin clean by frequent bathing; by keeping his muscles strong by proper exercise,

and by avoiding all kinds of of nerve exhausting exercise and habits.

But HOW NOT TO TAKE COLD: That is one of the things which it is important for us to know , if we wish to keep our physical condition proof against germs,--if we want to keep ourselves germ-proof--and that is very important., for we find that all diseases are due to germs (even warts, as some say). Some one has proposed the theory that corns are due to germs, but I have always thought that corns were due to tight shoes, and I think that theory is sufficient as to the cause of corns, without supposing that germs are connected with corns in any way.

The first thing to do, if we want to keep ourselves proof against disease, is to keep ourselves in an insusceptible state,--and that is what we must do, in reference to colds. We should not simply undertake to dodge a cold, but we should keep ourselves on such a high plane of vital resistance to disease, that a cold cannot catch us (because, really we do not "take cold",-the cold takes us). Now we want to keep ourselves in such vigorous health that a cold cannot catch us.

Now what particular susceptibility is it that leads us to take cold?--that is a very important thing for us to know .---- First, let me ask another question : Why don't we take cold all the time, every day, and always? Why are we not all the time taking cold ? What is a cold ? A cold is a state of the body in which the circulation has been disturbed,--the circulation through the nervous system. A cold primarily, is a nervous disease ; all

diseases are nervous, to a certain extent , which sometimes makes it difficult to decide whether the disease is purely a nervous disease or otherwise.; but, as matter of fact, the nerves are involved in every disease. There are some diseases, however, which seem to be almost wholly confined to the nerves. . But there is no general disease which affects the whole system, in which the nerves are not largely involved., and, in reference to a cold, I think we may say that in its beginning, it is strictly a nervous disease.

How does one take cold ? Here is the body exposed all the while to conditions which induce colds under some circumstances. Now why do not these same conditions induce colds all the while ? When a person takes cold, (as I have said) he is in a condition in which the circulation is disturbed; the blood-vessels in some part have too much blood, and in others not enough,--for instance, a person finds himself with a hot head and cold feet, sneezing, with cold chills running up and down his spine: there is not enough blood there; and he finds himself suffering from a variety of nervous disorders. One of the first things showing that one has taken cold, is sneezing. You say ~~that~~ when you sneeze, "That is a sign that I am taking cold", but it is not a sign that you are taking cold,--it is a sign that you have taken cold . Now that sneezing is a kind of paroxysm or fit which nature produces, to show that she is endeavoring to reestablish the balance of circulation. Just observe when a person has

a hearty sneeze; when the paroxysm seizes him, it affects him from head to foot; when a person sneezes, the paroxysm which has been coming on, reaches its climax, and you will see the feet of the person come up off the floor, his hands will come up, and his muscles jerk all over the surface of the body; it is like a person having a fit , and this general jerk must be due to the impulse thrown out from the central nervous system. Every center of the muscles, and every muscle in the body almost, is involved, when a person sneezes. The reason for this is, that the nerve-centers have been affected by the unnatural stimuli of the nerve-centres caused by the disturbed circulation which is the result of a cold . It may be that his feet have been chilled, and the sensation has been carried up to the nerve-centers of the brain, and so there is an indication of danger there, and nature is so much interested in this matter, that she has called upon the whole system to make an effort to meet the danger,--to make an effort to meet and overcome the danger, and to reestablish the disturbed circulation.

Now, as to the exact modus operandi of taking cold : to illustrate by a cold in the head, for example,--a person gets a draft from a partly opened window, or a crack in the window pane, on the back of his neck--in some way, there is a cold wind blowing in upon the back of his neck, which causes a contraction of the blood-vessels. You know, if you put your hand in water, or upon ice, the muscles contract and the skin becomes blanched, — perfectly

white; the muscles of the skin contract, because the nerves which control the blood-vessels are stimulated; they carry the impulse up to the brain, and the brain sends down on another set of nerves a direction to the blood-vessels of that part of the body, to contract. "Why", you will say, "we need more blood to give warmth to that part of the body where the cold has been applied ! Why does not the brain send down an order for the blood-vessels to relax ?" Because it would be dangerous; there is so much surface exposed to the cold, that if the ~~nerves~~ blood-vessels were relaxed, there would be a further exposure to cold in consequence of that relaxation; we should have so much exposure of the surface to the cold, that the heat-supply of the blood would not be sufficient to meet the demand of ~~the body~~ the body, and to make up for the loss of heat caused by the additional exposure, and the consequence would be, that the temperature of the body would be lowered, and by lowering the temperature of the body too much, the patient dies. We must maintain our exterior temperature at about 98 1/2,° and the interior of the body at about 100°; so that we have to maintain a temperature of just about 100° all the time. If the temperature falls over 5° below normal temperature, we die, and if it rises so as to exceed 7° or 8°, we die. We have leave of nature to limit our temperature to 10 or 12 degrees, and we must keep the temperature there. We cannot live long, if the temperature passes these limits; We should die quickly, if the temperature fell quickly ,so we have this method of defense provided for us, that when cold is applied to the surface, the blood-vessels

contract, and that keeps the blood within the interior of the body, and the muscles of the skin being contracted, it becomes a better conductor of heat than it otherwise would be. .There is less conduction of cold into the body then there would be by the relaxation of the blood-vessels. This is a very important thing to observe. As soon as we are exposed to cold, there is a contraction of the muscles of the skin, so that "goose pimples" appear; the skin is drawn together in such a way that it is puckered up into little hillocks, in consequence of this drawing up of the small muscles of the skin. This is a very interesting point (referring to diagram). Here is a hair-follicle, for example: now, attached to each hair-follicle is a small muscle which runs up to the skin. Now, when this little muscle contracts, the effect is to lift the hair-follicle out a little, and as it is lifted out, it lifts up the skin around the hair; that is what causes these little hillocks. If you notice the little hillocks, you will see that there is a little hair coming up from each hillock. That is because these muscles are stimulated into contraction when cold is applied; at the same time the muscles which surround the blood-vessels are made to contract, and they close the blood-vessels up , and the skin is puckered up, as I have described, and so the proper condition and temperature of the body ~~is~~ conserved. That is the immediate effect of a cold,--and it is a very brief effect; and the reason of this is, to give the heat producing apparatus of the body time to get under way so as to produce more heat . The

application of cold is always stimulating to heat-production. We should always remember that, when treating a patient for a fever; simply sponging the patient off with cold water, will raise the fever at first. You must connect the use of cold water with the rise of temperature. The transient application of cold, while it contracts the blood-vessels and gives relief for a moment, is followed by a reaction. This is so as to enable the heat-producing forces of the body to get under way, so as to furnish the heat-supply demanded by the body; the consequence is, that when a person has been out in the cold air, the chilling effect passes away, and you will find the hands, feet, and ears reddened by the relaxation of the blood-vessels, and you will feel a burning sensation in consequence of there being such an excess of blood sent to these parts. That, I say, is in consequence of the reaction; the extent of the reaction and the time which it lasts, will always depend upon the intensity of the effect which has been produced by the cold. If the cold has been very intense and has been applied for a long time, then the reaction will be intense and will continue for a long time. If a person has had a little puff of cold air on the back of the neck, there will be a contraction of the blood-vessels, and the reaction will be transient. But suppose that patient has been exposed to a draft of cold air upon the back of the neck for a good while, or, if he has wet feet, and they have continued wet for a half hour or so,--the reaction will be correspondingly long; if the feet are wet for only 5

minutes, no harm will be done; but it is exposure to continued cold that is injurious. Now this long impression of a cold will be followed by a long and intense reaction, and the consequence will be, that there will be a soreness and lameness of the part exposed. The next day after his neck, for instance, has been exposed, it will be sore and lame. What makes it sore and lame ?. It may be that the feet have been exposed, and there is lameness all over the body, or his back is lame in consequence of this exposure to cold; there is a lameness all through the muscles, particularly the muscles in close relation to the part exposed. The cause of this is, that a reaction which is coming on, has caused a congestion of these parts, and this gives rise to a pressure on the nerves, and so there is a soreness in the part exposed. That is the philosophy of colds.

We have colds in almost every organ of the body,--wherever the reaction occurs. If the reaction is in the muscles, then ~~it is because~~ will we have a catarrh of the muscles; if it is in the lungs then will we have catarrh of the lungs; if there is a reaction in the nose, then will we have nasal catarrh ; if there is a reaction in the mucous membrane of the lungs, then will have the patient has the bronchitis; if it is in the stomach, then there will be is gastric catarrh; if the reaction is in the bowels, there will be is catarrh of the bowels, bladder, or rectum. there may be catarrh of any part of the body; if the reaction is in the eyes, there will be ~~are~~ sore eyes. If a person has a cold in the throat, there will be a sore throat and an irritation higher up also; he has an obstruction of the nose and he

cannot breathe freely because there is a swollen condition of the mucous membrane there; he has red eyes --perhaps a running of the eyes--and there will be a congestion there; it may commence in the throat and travel up through the Eustachian tubes into his head, and he hears a snapping in his head; and the hearing sometimes becomes dull in consequence of the thickening of the structures of the ear . But perhaps I have talked to you long enough about the philosophy of a "cold". A person takes cold in consequence of an action and reaction produced by unusual impressions of cold .

But we might ask, Why don't we all take cold, and why are we not always taking cold; and why does not every one of such instances of exposure give us a cold ? It is because there is in the body, a power to readjust itself, and to react without unfavorable results. It is only an intense reaction--an abnormal degree of reaction --which results in harm. A person takes a shower-bath, but he does not take cold in that way. Boys don't take cold snow-balling;--in fact the boy who goes skating sometimes falls through a hole in the ice, but he don't take cold ; he gets thoroughly wet, but when he gets out, he runs home as hard as he can scamper, and changes his clothing and gets dry, and the cold bath don't do him any harm; it only makes him a little more cautious about where he goes skating next time . Now the exposures to cold air and cold water, and the contact with cold substances alone, would do us no harm; it is only when we have

this excessive reaction that we receive harm.

Now what are the things likely to produce excessive reaction? The first thing which is likely to produce an excessive reaction, is an abnormally sensitive condition of the skin. When the skin is strong,--when it is accustomed to these reactions -- accustomed to these exposures --then we don't suffer in consequence of a slight exposure, or even a very considerable exposure, because the skin is accustomed to control these conditions. But, if the skin has been kept in a susceptible state, the result will be, that it becomes so sensitive that when any reaction or any provocation to a reaction is produced, it is too intense for the control of the skin. A person working constantly out doors in the cold air, might snow-ball half an hour, without finding his hands in the condition in which a dry-goods clerk or a young lady unaccustomed to cold would find their hands in an exposure of that kind for 5 minutes. Why ? Because the man's hands are accustomed to exposure to the cold air, and exposure to cold does not set up that intense reaction that is produced in the person not accustomed to such a condition. I remember, some years ago in the month of December, of riding out into the country to see a patient. I had a number of miles to ride, and it was snowing hard; there was snow on the ground, and there was quite a storm raging,--the wind was blowing and the snow was driving about. I was all muffled up;-- had on a thick overcoat, furs, thick stockings, thick leggings, and fur gloves on my hands--and I was tucking up the lap-robes around me to keep me warm. After I had got three or four miles out, I

was feeling cold, and was wishing I had something to cover over the end of my nose,--it was really a very cold day. As I was riding along, I saw a wagon load of wood coming up the road, and there was a man sitting on the top of the load with nothing on his hands, with no over-shoes, and no gloves , nothing about his neck and nothing about his ears; he simply looked like a man working on a summer's day. Well, I was so much interested in the matter that I stopped before I reached him, and begged him to stop a moment. He did so, and I asked him if he wasn't cold . "Why no," said he, "I'm not cold,--why should I be cold ?" "Why", I said, "it's a cold day. You see how I am dressed, and I feel cold, and I see how you are dressed, and I am surprised that you are not cold. Aren't your hands stiff and cold and numb?" "Not at all", he answered. "Don't your ~~feet~~ ever get cold ?" "No", he said, "I work out doors in the coldest weather, and I never wear gloves; I don't find any necessity for gloves, because I never wear any." I found, as I talked further with the man, that he never wore any clothing warmer than what he had on then; he had on a good thick woolen shirt, woolen coat, jacket and pantaloons, thick boots and thick woolen stockings (I suppose), and that was all the clothing he needed; there was no necessity for him to put on these extra covrings, simply because he had not been accustomed to anything of that sort. My father told me of one of his neighbors with whom he was acquainted when he was a boy who used to send his little boys and girls to school bare-footed the whole year round,--and

they don't wear anything upon their ears , or on their hands. He did that to harden them,; and it had that effect, for they never took cold; they used to scamper off to school half a mile away without anything on their feet or ankles, and they would go to school with feet as red as roses, and their hands and ears glowing with warmth,--perhaps a little numb and cold at first, but they never took cold in consequence of such exposures, because they had always been accustomed to it. But when we shut ourselves up in the house and wear warm clothing, we become susceptibe to these changes. That is the way in which we become susceptible,--by putting on these artificial skins; and we make our hands susceptible by wearing gloves. When we go out doors, where the temperature is equable, the muscles don't react; but when the atmosphere is not uniform, and the muscles react, they overdo the thing. I remember of having an excessive reaction in my ears at one time when I was taking a sleighride, and the wind blew against the side where I sat, and I had neglected to provide myself with proper wraps. When I came home, one ear was stiffened and very cold, and the next day, it was twice as big as the other ear, the reaction was so intense. Now that is what happens when there is such a reaction, to the mucous membrane of the nose. When we take a hard cold, the intense reaction makes the mucous membrane twice as thick as it should be, and that obstructs the passagesof the nose so that we cannot breathe through the nose. That is what makes the voice hoarse,--because the mucous membrane which covers

the vocal chords, becomes thicker than it should be; the vocal chords are thicker than they should be, and then they have not the flexibility that they should have, and we become hoarse, and it is very difficult to speak.

Now I think you can see from what I have said, that the thing necessary to be done in order to avoid taking cold, is to render ourselves insusceptible to cold,--in other words, to harden ourselves against cold. That is the only way in which we can avoid taking cold. At this time of the year, people usually shut themselves up, and shut themselves away from cold; they shut up their houses , start their fires, and then they raise the temperature of their rooms too high; this is the case, especially in this country,--we raise the temperature too high,--(and this morning we have it raised to 78° here in the parlor! That is too high. The young man is not here, whose duty it is to be here and attend to this matter, --although I have given him an earnest exhortation to attend to it; I will have to talk to him again about it .) In consequence of this habitual overheating, we render ourselves susceptible to cold, so that when we go out doors and expose ourselves to a little higher temperature than ordinary, we take cold . In England, the fashion is, to keep the temperature at about 60? I think I never knew the temperature to above 60° in an English house, or in an English hospital. I found the temperature in the "Consumption House at Brompton, England at 52° in most of the wards, and I never found it above 60? Now if we should lower the temperature in this building below 60°, I am sure every one here would

complain of its being cold. Those who go from this country to England think it is very cold there. I found a gentleman from this country who had been in England 20 years,--and he told me he had never been warm yet. A person ought to become accustomed to the temperature after a while, but for some reason, this gentleman didn't get accustomed to it; he didn't like his environment very well. It is a little damp in that country, and it feels chilly on that account ; but this lower temperature has a tendency to produce an insusceptibility to cold. It is a common thing in England, both in summer and winter, to see the little ones running about in their short dresses and with their legs entirely bare,-- their little stockings are only about so long (reaching about two or three inches above their shoes). Their legs are generally bare for about this (motioning) distance. It is painful for us who are in the habit of seeing children better dressed, to see those little red legs running about the streets,, looking just as red as beets. I said to a mother while in that country, "Don't you think it harmful for your children to be dressed (or undressed), in this way? " "No" she said, "not in the least." A lady with whom I was expostulating in regard to this way of dressing her children, said , "I put stockings on my little girl, and the doctor insisted that I should take those stockings off; he said that I was doing wrong,--that I must harden the child,, and I did so." I asked her if she found that this was injurious to the health of the child, and she said it

was not.. The doctor said it would harden the child. I am not sure but what it was a good thing to do. While in England I inquired in reference to the prevalence of catarrh, and I couldn't find any one who knew what the word "catarrh" meant--except the doctor, they didn't know what the word meant, and I am inclined to think that that disease is not so frequent there, as in this country,--although it is a damp country, and the temperature is more changeable than ours. The ~~result~~ frequency of this constant change of temperature there, is, to give the people a chance to take cold; nevertheless, I think, in England there is not so great prevalence of nasal diseases (diseases due to colds), as in this country, although quite prevalent there .

Now the important thing (as I have already remarked), the important thing to do, is to know how to cultivate insusceptibility,--how to render one's self insusceptible--how to avoid becoming susceptible to cold. If a person begins, at the approach of cold weather, to put on a great amount of extra clothing, shuts himself up in the house, keeps it very warm, raises the temperature of the house to about 75° or 80°, the consequence will be, that he will become so very susceptible, that the slightest exposure will give him a cold. Instead of covering the throat with mufflers (as is usually done), one should go out without any protection to the throat, simply throwing a light wrap about the shoulders, but not protecting the throat. I have known persons to become so susceptible that they could not expose their bare hands out of doors,

without taking cold. If we were to accustom our feet to cold, they would be just as insusceptible to cold as any other part of the body. We might render them so by going out of doors bare-footed, as well as bare-handed. There is no more reason for taking cold from exposure of the feet, than there is from exposure of the hands, except the reason that the feet are not so much accustomed to exposure as the hands. If a person with a warm comfortable about the neck goes out of doors, there will be perspiration there, and when the comfortable is taken off, the evaporation of the moisture will give the person a cold.

Suppose we review a few of the ways in which people take cold. First, we will notice the way people take cold in-doors (I am afraid we will all take cold here today, for they have turned on too much cold air, and the temperature will fall too rapidly. Close the windows, so that the air will not be cooled off too quickly. It is the sudden cooling off that produces the reaction. If we cool off slowly, the system has time to readjust itself .) Now, in reference to doors and windows : the first thing to be regarded, is the windows. If the windows are open, you are afraid of them, and if they are closed, you are not afraid of them,--when perhaps the closed window is the more dangerous of the two.. If you sit down by a closed window on a cold day, you feel a draft of cold air, and you think there is a draft, but as you look around to find a place through which it might have come, you can't find any hole, and you wonder where the ~~cold air~~ draft came from. It does

not probably come from the window (although it might possibly come through some aperture about the window). What is it, then It is simply the falling of the ~~cool~~ air which has been cooled by contact with the window. As the warm air comes into the room, it rises to the ceiling, and then goes to the window where it gets cooled off by the window, and then falls down, and this is the cold air that you felt on the back of your neck or head, which you thought was the wind blowing on you from out doors,--it is the falling of the air which has been cooled by the window. If you set a thistle- down to floating in a warm room, it will rise up an go to the ceiling, float around the ceiling and finally settle on the window sill. That is the reason the dust settles on the window sill more than other places,--because it is carried by the air over to the window, and when the air is cooled by contact with the window, and falls, the thistle-down falls with it, onto the window sill.

Another way in which we take cold in -doors, is, by neglecting to regulate the ventilating apparatus and the heating apparatus properly. If you raise a window ,for example, in an hour or two the wind will change, and then the wind comes blowing in through that window, and the temperature of the house is lowered very much, before you are aware of it. It may be that it is not a well-regulated heating apparatus, and in consequence of that, the temperature of the house will fall 10° perhaps, and if you are a susceptible invalid that fall of temperature will give you a chill, unless you give immediate attention to the matter .

Another thing which will cause you to take cold, is, the going out doors and coming in without taking proper precautions . One man tells us that he took cold because he went out on a damp day,--he says, "I ought not to have gone out today; it is a damp day, and I took cold." He took cold in consequence of going out, but he did not take cold while he was out doors, but when he came into the house. "How is that?" you ask . When he went out, he put on rubbers to protect his feet, a McIntosh to protect his body, and he carried an umbrella to protect his head. . When he comes back, what does he do ? He lays aside his umbrella (that doesn't do any harm); then he lays off his McIntosh and rubbers, and then he begins to take cold . "Why, " he says, "I didn't get wet at all." But you did get wet; you didn't get wet with the rain,--you got wet with perspiration while you were wearing this McIntosh and these impermeable rubbers, and the perspiration from your body, which had been accumulating while you were out, has been soaked up by your clothing, and your stockings also are moist with it; you know how it is, if you wear rubbers for a long time,--your feet are damp simply from the accumulation of the moisture thrown out by the skin; a ~~pint~~ and a half of water is thrown off by the skin in 24 hours,--and sometimes much more than that. Now if you have been out a couple of hours, you can see, by a little figuring, how much moisture there will be in your clothing when you come in: — A pound and a half is 24 ounces;24 ounces in 24 hours, --which is an ounce an hour. So that in an hour and a half you will have ~~about~~ an ounce and a

half of moisture which has been thrown off by the skin and soaked up by your clothing while you were out doors this hour and a half, protected by your rubbers and McIntosh; this is about half a glass-full of water. Now if you should have a half a glass-full of water thrown over you, it would be sufficient to moisten you considerably. Now this amount of moisture is spread all over the body; when you take off the McIntosh and rubbers, this moisture begins to evaporate into the room,--and it is a more rapid evaporation than there would be out doors, because of the dryer atmosphere, and then you begin to shiver, and you begin to think, "I have been out doors and got damp out doors and taken cold." That is a great mistake; you didn't get damp in that way, but you got damp from the accumulation of moisture in your clothing under the McIntosh and the rubbers. What should you do when you come in? You should take off your stockings and put on dry stockings, and change your underclothing, so that this rapid evaporation will not occur. Now I consider this one of the most important suggestions which I can make, because this point is but little considered. There are two things then, to be considered, in regard to avoiding taking cold in-doors; 1st, sitting near windows, 2nd, in reference to taking off wraps and changing under-clothing upon coming in out of a damp atmosphere. One of the most insiduous means of taking cold (because, in this respect, precaution is the most neglected), is that of sitting near a closed window. Most people know better than to sit down by an open window with the wind blowing on some particular part of the body--on the back of the

neck or head, perhaps--but they fail to recognize the fact that they are equally exposed when sitting by a closed window, when there has been a tendency to produce too much perspiration,--the cool air falling upon some part of the body which is not insusceptible to cold .

But there is one thing more,perhaps, that I should mention, in reference to taking cold in-doors : Why does a person take cold in-doors from a little current of air, and yet he don't take cold out doors when there is a strong wind is blowing upon him ? I presume you have noticed that a person does not take cold while out doors in the wind, and that he does take cold in-doors in a slight draft. A certain doctor in New York has recommended to a person, that if he wishes to avoid taking cold, that he should open the door of his sleeping apartment, shove the window clear open on the other side of the room,--that he should open the door wide, and then push his bed between the door and the window, and just let the wind blow over him all night long ! Now,for weak persons, I don't consider this a good prescription; sensitive people would die from a cold in that way. Persons accustomed to air and drafts would perhaps be cured in this way. I have known people who go out and work hard all day, and come in and take cold, and then, by this treatment the oxygen they breathe in,and the vigorous stimulation to the system which they receive from contact with cold air (the dense air of the room passing out) has the effect to enable them to throw off a cold . It is good treatment for a vigorous person,--but not for feeble persons .

Why is it that a person takes cold in a draft in-doors, while he does not take cold out-doors. The idea has been advanced (but I think it is incorrect), that the reason is, because the person out-doors is exposed to a draft on all sides, while, when he is in-doors the wind blows only upon some particular part alone; but this is a mistake. You never knew the wind to blow from all sides at the same time. The wind blows in some direction, and if it blows upon his back, then that part of the body is exposed; if it blows in front of him, then his face is exposed. But it blows upon all sides of him at the same time, while he is out-doors, any more than it does when he is in-doors. But it is a fact that a person does not take cold out-doors, while he will take cold from a draft in-doors, and there must be some reason for this. I have been thinking about this fact and seeking for a reason for it, and it has occurred to me that the reason that while in-doors, we are exposed to a higher temperature than ordinary. About 70° is the ordinary temperature in-doors,--although a person would consider it dreadfully hot out doors at 70° or 80°. In the winter time, many persons keep their apartments at a temperature of 80° or 90°; I have often found patients with a temperature at 90°, sitting by a coil and complaining that it isn't warm enough. These same patients, in the summer time would complain dreadfully, if the temperature were kept at 90°; and it is true that 90 is more uncomfortable in the summer time than in the winter time, because the air is not so dry. When the air is dryer, we can tolerate a higher degree of temperature; but we ought to cultivate a lower temperature in the

winter time than in the summer (which is usually about 70° ~~in degrees~~). The skin must throw off a definite amount of moisture. What for ? To keep the body cooled down to a given temperature. If we should leave the temperature at 30°2 there would be comparatively very little perspiration, and the greater part of the fluid thrown off would be from the lungs and kidneys; but when the temperature rises to 70°, then the skin throws off a much larger amount of moisture , the lungs inhale less moisture, and the secretions of the kidneys are more highly colored than in winter ,than in summer. On a damp day, they are light colored. On a warm day, they will be darker colored. This variation in color is due to the difference in quantity of moisture thrown off by the lungs and kidneys--the moisture thrown off being greater in the winter than in the summer--while the moisture thrown off by the skin is greater in the summer than in the winter; ~~it~~ the temperature is managed between these organs interchangeably, as we might say. The temperature of the atmosphere is usually about 70°, and a large proportion of the moisture of the body is thrown off by the skin, at that temperature. There is a large amount of moisture thrown off by the skin. Now I would like to have you try this experiment : just moisten your finger and then blow on it,--it feels cool. Why is it cool?--the breath is warmer than the finger . It is because there is a large quantity of air brought in contact with that surface , and this causes evaporation of the moisture and it becomes cool there. So, when you wish to know which way the wind blows, simply moisten your finger and hold it up, and notice on which

side the finger feels cool, and you know that is the direction in which the wind blows. Now take this as an illustration. Here is the body perspiring; the clothing confines the moisture more or less, and the clothing constantly contains more or less moisture that has been absorbed from the body. It is the moisture which gives an odor to the clothing,--that is the way the odor gets into the clothing--it is by the moisture which is carried off by the skin, and the substances in solution are absorbed into the clothing. Now suppose some one should blow upon the small of the back of this person, with a bellows: you can see that there would be more evaporation in that part of the body, than in any other part, and the consequence would be, a lowering of the temperature of the body. That is the reason we take cold from a draft in-doors more easily than we take cold while out-doors. When a person is in-doors, the warmth of the room keeps his skin active, and the moisture thrown off moistens the clothing, and the body is more susceptible to cold; but when we go out doors, the cold tends to check this evaporation, so that there is less moisture on the surface; at the same time, the lower temperature to which the body is exposed, has the effect to lower its temperature, and producing an equable distribution of blood to the skin. So the reason why the effect of a slight draft of air is less than when one is in-doors, is, that the susceptibility of the body is lessened by the toning-up of the system from the out-door air. But, if a person is in a room where the temperature is 70° when the

wind is blowing cold out doors, if he runs out in the wind and remains out for 5 minutes, he is likely to take cold in consequence of that exposure. In that way, people will take cold when running across the street to see a neighbor,--they think it is not far enough to put any extra covering on the body or upon the head, and so they run out of the room in which they have been perspiring into the cold wind, and the action of the skin is checked, and the evaporation of the moisture from the body causes a chill, and they take cold in that way.

How can we render ourselves insusceptible to these colds which we are so likely to contract by reason of this varying temperature? The thing to do, is to accustom the skin to these very changes of temperature. . How can we do that ?? There is but one way of doing that,--and a very simple way it is--and that is, by contact with cold air. The tendency is, to employ baths which are too warm; the sensation of cold water is unpleasant, and so they accustom themselves to warm baths, instead of cold baths, and so the skin is kept in a susceptible condition all the while . The proper thing to do, then, (as I have said), is to accustom the skin to reaction ,and this may be done by means of cold baths . Step under a shower-bath at 70°, and you will feel a chill, and the "goose-pimples" will appear. You step out from under the shower-bath for 5 minutes, and you will feel a glow all over the body, and that glow will continue for some time . Now suppose you step back under the shower-bath again for another 5 minutes,

and you will find that the reaction will not be so powerful as before, but it will be longer in coming. After the reaction has occurred, step back under the bath and get another chill, and there will be no reaction, but, instead of that, there will be a continued chill; after two or three hours, there will come a reaction, and you will find that you have taken cold. The important point, is, to get one sudden, sharp reaction following a short application of cold. If you keep this principle in mind, you will find that you can take cold baths and secure a good reaction. I have experimented a good deal upon myself in this way, and I find this principle to be true. I find that insusceptibility to cold can be secured by this means. The other day, I met a gentleman some 50 years of age, who told me that for thirty years, he had taken a cold bath every morning of his life, and that in consequence of this cold bathing, he had never taken cold,--until recently a doctor had prescribed warm baths for him, in consequence of which, he had taken cold . Now I have no doubt this was true; it was probably the result of the fact that he had not allowed himself to be toned up sufficiently after his cold baths. In the summer time, there is not so much danger, because the temperature is high enough to prevent any great liability to these sudden chillings of the body; but when cold weather begins, we should observe this matter with great care. Suppose you have fomentations over the stomach; they will doubtless make you perspire, if you are in a warm room,--it may be a sitz-bath, or a

foot-bath --or some other bath which will make you perspire; if it makes you perspire generally, you must have a good toning-up afterwards; if you don't, you will be liable to take cold. When you come out of the bath-room, you must not come out with a perspiration, with your pulse bounding and your cheeks moist, because, if you come out in this way, and are exposed to a current of air, you will take cold. It is the duty of every patient who goes into a bath-room, to see that he is not in a heated state when he comes out. If you come out of your bath in a heated state, after the most restricted form of a local bath,--if it is a simple fomentation, if it has got you into a heated condition of the skin, so that the temperature is higher than normal: when you come out, there will be an extra evaporation of moisture and a chill; this does not come from the halls,--it is because of the evaporation of the moisture from the warm skin; there has been an increased activity of the skin, and there will be, in consequence, an increased evaporation of moisture. The activity of the skin is always increased by a rise of temperature. Now, what shall you do?? Suppose you have a fomentation of the spine; you will see that a sponging of cold water, or the application of a bit of ice or a piece of flannel, will be necessary, so that the skin will be cooled off before you leave the room. Suppose you have a warm electrical bath: you should allow the temperature of the bath to cool down, until it is not higher than 80,--it should be cooled down to 75. When I take baths, I let the temperature cool

down to 40°. I have been very uncomfortable while bathing, this summer, because I couldn't get water cool enough for a good toning up. I find a great advantage in taking these cold baths. I jump into a tub of warm water, and then I cool off, and have a good reaction, and then I feel fine for the whole of the rest of the day.; it starts the skin into activity, and stimulates the nerve-centers and gives me a feeling similar to that which a stimulant would give,--I suppose it is a kind of stimulant. This is a good thing for a person to do, who is strong and vigorous, and can bear it. I think it does them no harm; it is one of nature's finest stimulants. But when you take a warm bath, be sure that the temperature is cooled off sufficient to create a good healthy glow,--it should feel a little chilly; you mustn't be afraid of being "chilly". One gentleman said to me that he took cold in the bath-room. "How did you do that"? I asked. "In taking an electrical bath." "How do you know you took cold in the bath-room?" "I felt a shiver run up and down my spine". "Did you allow yourself to cool off after you had taken your bath"? "No, but I took cold in the bath-room." "But you took cold when you came out". If you find, after your bath, that your skin is heated and perspiring, it is because you have not cooled off enough; you must go back an and do it over again,--you mustn't come out with the skin heated; if your bath has left you with your pulse full, and you feel a little headache--a fulness of blood in the head, or an unnatural warmth, you must go back and do it again.

It is a dangerous thing to take cold. If I find that a cold

hes been taken through the negligence of a nurse, I feel very much chagrined about it, and that attendant or nurse gets a good lecture, when I find out who is responsible for it, for I consider it a serious matter for one to take cold .

We don't need to take cold,--especially when it is getting cooler and winter is approaching. Winter time is the best time of all the year to get well in,--it is one of the best seasons of the whole year for health.. I think it is a great mistake for people to run away from cold weather; the idea that people must go somewhere to spend their time , where it is warm weather, is a great mistake. The winter, is the most health-giving part of the whole year. Most people gain flesh during the winter --altho' they consume more tissue in the winter than in the summer. Most people gain flesh in the winter and fall; they feel a gigher degree of activity, have a fuller pulse, and a stronger heart-beat and greater strength in the winter than in the summer. This is because of the purer air. But we must take this precaution,--we must not take cold when we take stimulating baths. Baths, or fomentations--of the liver, for instance-- will increase the activity of the liver, and when the person takes cold, the activity of the liver will be lessened to a greater degree than it was increased by the fomentation. Suppose you have a disease of the limbs--a swelling or rheumatism, and you take a warm bath as a treatment, unless there is a toning up afterwards, your rheumatism will be increased ,--you will have more rheumatism than before. But it is necessary that there should be a gradual, instead

of a sudden cooling-off, --unless the cold application has been very brief indeed. You should all take woollen blankets or extra shirts to your bath-rooms, so that when you come from the bath-room with a little perspiration, you will be protected, just as you should be after going out of doors, until the system has settled down to its normal condition, so that the skin will resume the necessary activity.

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Begin on pr. 2.

The articles runs through both pages

SANITARIUM LECTURES (Oct. 23, 1891.)

copy between curves.

J. H. KELLOGG, M. D.

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Good morning, Ladies and Gentlemen : I am quite at a loss what to talk about, this morning. It seems to me that I have covered everything I know,--that I have talked about every health subject imaginable. I have been talking here for about 18 years now,--I think it is just 18 years since I began to talk here, and it seems to me that I am pretty nearly talked out. I have a cold this morning, which I suppose I am to blame for myself, but I get so much interested in my work, that I don't pay any attention to what my conditions are, and now I can hardly talk in an understandful way. . .

Well, when any one can't think of anything else to talk about, they talk about the weather,--so, let us talk about

T H E W E A T H E R .

I used to notice, when I was taking meteorological observations for the Signal Service (we have kept a volunteer Signal Service observatory here for the last 17 or 18 years,--I used to take the observations myself; did so for a good many years; they are now taken by one of our students) that when the barometer was down, when I got over to the Sanitarium, I found the moral and mental barometer low there, too. I always observed that I could tell by the barometer just about what I had to meet, and so I used to fortify myself, and get my courage up to the highest notch so as to

be able to meet a lot of blues and despondency when I got across the road and met the Sanitarium patients.

It used to be very much of a puzzle to me, to know how it was that I used to be so much affected by the weather. There are a great many people who say they are not affected by the weather. If you tell a man who is suffering from a pain in his joints, or has an attack of indigestion or has nasal trouble or chronic catarrh a little more than usual,--you tell such a man that it is because there is a change of weather, or because the weather is a little bad, and the majority of people will say, "Now, doctor, it's no use to tell me that this aching pain is due to the weather,-the weather does not affect me at all". I have been told this by at least 500 people,--that the weather had no effect upon them at all--that they were weather-proof. Now this is altogether a mistake; we are all affected by the weather. (There is not a human being; there is not an animal ~~living;~~ that lives there is not a plant that grows, ~~that~~ which is not more or less affected by the weather. The weather is made up of a variety of conditions of the atmosphere, and we are all dependent upon those conditions for our physiological state to a considerable degree.)

Now, in the first place, let us consider, as to what the elements of the weather are chiefly composed,--and in doing so, we must first consider the temperature: we may have cold weather, or we may have warm weather. Then we may consider, in the next place the condition of the air as to moisture,--we have damp weather, and dry weather. Then as to the clearness of the

atmosphere, as to sunshine or cloud; we have considerable sunshine, and we have cloud,--bright weather, and cloudy weather. Then we may consider wind-pressure (and barometer -pressure is properly included in that), we have quiet weather, and we have windy weather. And the direction of the wind has something to do with the weather also. There are other elements which we do not always observe, and yet, which belong to the weather,--the electric conditions of the atmosphere, which are constantly changing; there are electrical currents and electrical changes continually taking places between the air and the earth. I believe it has been considered by electricians, that the earth is a sort of vacuum, capable of absorbing any amount of electricity. Electricity is generated in the atmosphere in a great variety of ways,--by friction of the air on the leaves, contact of the air with the earth's surface, and molecular changes which are taking place when changes of temperature occur. All these conditions produce electricity... Dry air is able to hold more electricity than moist air, and so, many changes of this sort occur.

(Let us ~~see what elements we have to consider~~ consider the elements, which go to make up the weather : temperature,--moisture or dryness; atmospheric pressure,--windy or calm weather; bright or cloudy weather; ~~and then~~ besides changes in electrical conditions. ~~As to sunshine or cloud, the amount of sunshine which we have~~, is a matter of great ~~consequence to us, as well as the electrical changes~~. Now, there are five different conditions or changes of the weather,--

herself to these different conditions of the atmosphere,--for example, the temperature? How is it that nature provides for a comfortable state of the body under all the extremes of temperature? We find, for example, in the torrid regions, the temperature sometimes as high as 130° or 140° in the shade; and -120° in the shade in the torrid regions is not uncommon. I have been told by those who live at Fort Uma, N.M., that they have seen the temperature 130° in the shade; one man told me that he had seen it at 135°.

Now, in the Arctic regions, the temperature is frequently observed to be 40°, 50°, 60°, and even 70° below zero. There is a great difference between 120° above, and 70° below zero. One would suppose it would be impossible for animal life to exist at these extremes of temperature,--and yet it is possible. This is because nature has a self-regulating, automatic arrangement for governing heat-production and heat dissipation in the body. These two principles are in constant operation in such a way that one controls or balances the other; for example, the heat-making processes of the body are governed by a heat-controling center at the base of the brain. (Referring to diagram.) Right here is a little heat-center (a thermal center, as it is called), and this heat-making center has for its

business, the control of all the heat-producing functions of the body. (When one has a fever, it is because the heat-making centre is excited, - there are poisons which excite this nerve-centre; or it may be due to the fact that heat dissipation is lessened. At the same time that this heat-producing process is going on, ~~are~~ the action ~~other processes going on~~ by which the heat of the body is being dissipated. ~~And what are these processes? They are two.~~ The first of these processes is the contact of the cold air to the surfaces of the body, which carries off heat by convection, just as ~~the~~ air comes in contact with a heated ~~the~~ stove ~~and~~ carries the heat away from it by circulation; second, ~~the~~ the evaporation of moisture from the ~~the~~ body surfaces-- the surface of the skin and the surface of the lungs, ~~which afford a very large surface for contact with the air.~~ A continual evaporation of moisture from the body is the principal means of heat-dissipation. This mean of removal of heat from the body is very much greater than would at first be supposed. If you place one hand in cold water and the other hand in warm water, ~~and~~ in a few moments one hand will be warm, and the other hand will be cold. When you are out doors in a warm day, you will perspire freely, after exercising; you sit down in the shade, and pretty soon you will begin to feel chilly, and you take cold, although it is a warm day, simply because you ~~have~~ got wet, by having the skin moistened with perspiration, and the sudden evaporation of that moisture has chilled you and given you a cold. To illustrate this principle; just moisten your finger with your lip and then hold it up, and you know which way the wind blows, from the fact

that the side which is moistened and on which the wind blows will be cooler than the rest of the finger,--the evaporation of the moisture by the wind has cooled that part of the finger. So we see that evaporation is a means of cooling. If we place ether upon the hands (saturating ~~them~~ with simple ether), and then blow upon it, the heat will be carried off from the skin so rapidly that there will be a perceptible chill there. In the same way we have a bad cold produced by the processes of evaporation going on constantly from the skin and from the mucous membrane of the lungs. (The mucous membrane of the lungs ~~affords~~ affords the greatest source of heat di sipation, for the reason that there is such a vast extent of ~~lung~~ surface there; ~~we have the air circulation in and out of the lungs, and~~ all the minute winding channels and air- cells ~~many millions of them leading to the lungs, all covered with this lining mucous membrane.~~ If this mucous membrane were ~~stripped off and taken out of the body and~~ spread over a level surface, it would cover ~~the floor of this whole room; it covers~~ from 1400 to 2000 square feet of ~~lung~~ surface ~~some have estimated it higher.~~ You can see that evaporation from so great a surface must be very great indeed ~~it is really immense. We have~~ The outside of surface of the body constitutes only about (7) square feet, and consequently the evaporation from ~~a surface of 2000 square feet~~ the lung surface is much greater than from ~~a surface of 7 square feet~~ that of the body surface!

Now this means of cooling the body is under constant regulation. There are in the body,--and also in the brain--~~some~~ nerve-

centers which send out fibers ~~(primitive blood-vessels)~~ all over the body, and these fibers have for their duty, the transmission of messages to the nerve-centers of the brain which control the little muscles ~~which~~ surround the blood-vessels ~~and help form the walls of the blood-vessels,--these little vessels might here (referring to diagram) receive these nerves,~~ and these nerve-centers are made to contract, and by that means, the blood in any part of the body may be controled. ~~So,~~ when there is the requisite amount of evaporation from the skin, ~~nature pours a large quantity of blood into the blood-vessels of the skin, by relaxing the blood-vessels,--~~ the blood-vessels ~~being~~ relaxed, the skin is filled with blood. Before one breaks into a perspiration, his skin is hot; ~~and when he exercises, he feels not~~ and uncomfortable, ~~and when he breaks out into~~ as perspiration, he feels better.) This, you see, is a matter of very great importance. Suppose one could not perspire,--suppose he had this feeling of heat as the result of exercise and yet could not perspire: suppose it were a very hot day and the temperature outside were rising, and the heat-making processes of the body were rising also, and one is in a feverish heat and cannot perspire,--you can imagine how uncomfortable he would be. When a feverish patient begins to perspire, the doctor always says he is better. When a patient has a long continued fever, --lasting day after day, and week after week--during which the doctor goes and comes on his rounds, and when he finds his patient in a gentle perspiration, he says the patient is better, because he has reached a point where he can begin to perspire.

This perspiration is nature's means of subduing the fires of the body and preventing their rising to too high a point.

But "what has all this to do with the weather ?" It has a great deal to do with it, for the reason that the varying conditions of the atmosphere control, to a large degree, the amount of evaporation from the skin. I might cite, as an illustration, a common observation,--that, in riding behind a team in the country, you have sometimes noticed that just before a rain, the weather was dull, such a morning as this, for example, the horses would seem to perspire very freely. On a summer day when the air seems damp and heavy, while the horses are at work, they will perspire and lather and seem to be in great distress,--they blow and pant and seem exhausted. By and by, the rain comes down, and after the rain passed off, the sun comes out, the weather clears off: the weather has changed--and you find that the horses are perfectly dry although they work harder than before, and they seem to be full of energy, although the weather is not so warm as before. How why is that ? It is because, before the rain, the air was saturated with moisture, and consequently the perspiration of the horses could not evaporate, as it did on a dry, bright day before the rain, hence they could not perspire so freely, and became exhausted easily while at work,--the moisture of the skin is not immediately carried away, and the perspiratory glands could not operate so freely. The amount of perspiration thrown off by the body depends somewhat upon the rapidity with which the air takes up the moisture. This is also true of the

lungs: these 2000 square feet of lung-area depends upon the amount of moisture in the air, for its ability to throw off moisture. If we breathe air that is saturated with moisture, and the atmosphere also is saturated with moisture, of course it is impossible for the air to take up that moisture. You that are housekeepers, know that you can't dry clothes on a damp, rainy day. Even if it does not rain where you are, if it rains half a mile away and the atmosphere is charged with moisture, it is hard work for a washerwoman to dry her clothes on such a day as that. (On a rainy day the clothes are damp, the house is damp, and everything one touches feels damp ~~on a rainy day~~, even though ~~one~~ it is not exposed to the rain; ~~everything in the house is damp, although it has not been rained upon.~~ This is simply because the air is full of ~~water~~ moisture, and hence it cannot take up any more; ~~so a little more moisture is deposited in the circulation, so as to lower the temperature~~ of the body.

You see then, that it is a very important thing that the air should be regulated according to the demands of the body. (If the air ~~(as I have stated),~~ is saturated with moisture, ~~then we cannot throw off any more moisture from the lungs into the air,~~ and the moisture which the lungs should throw off into the atmosphere, thus cooling the body and lowering its temperature, is retained in the body; and not only is the moisture which should be thrown off by the lungs retained, but also the moisture which should be thrown off by the skin, ~~is retained.~~ Now this perspiration contains certain poisonous elements, which, if ~~the elements are~~ not

~~are~~ necessarily retained

thrown off, ~~the result will be the retention~~ in the body, ~~of these poisons~~ with all their various disturbing results. ~~The amount of moisture in the air becomes a very important matter for our consideration.~~)

The amount of moisture in the air is constantly varying. It is interesting to know something about that . Experiments have been made, by taking the moisture all out of the air, and then testing it when it has been saturated, at different temperatures showing that the air contains, at a temperature of 0° (zero), one drop (about half a grain) to a cubit foot of air; when the temperature rises to 25°, it contains 2 drops of water to a cubic foot; raised to 50° it contains 4 drops; at 75° it contains 8 drops, and at 100°, it contains 16 drops of water diffused through a cubic foot of air. In other words, the amount of moisture which the air can contain, is doubled for every addi - tional 25 degrees. Observers differ a little in this estimate, some placing it at 27°, some at 28°, and some at 25° per cubic foot of air; we will call it 25°,--because--we can easily remember that. Now you can see, if we have a sudden cooling of the atmosphere, what the effect would be . When the temperature is 75°, the air is damp, but when the temperature falls 25°, the air becomes cool and dry. Why is it dry ? Because it contains only 4 drops of water per cubic foot of air, which is only one ~~fourth~~ half as much water as it can take up at 75° . So that when that air comes in contact with our body (or anything which contains water), it extracts water from it,--because the air is always thirsty-- unless it has swallowed all the water it can possibly hold. Then, if the air

only contains 2 drops to the cubic foot, when we are in contact with the air, it would seem moderately dry to us; if it contained only one drop to the cubic foot of air (instead of 4, which it is capable of holding), it would be a very dry air. When the temperature is 0°, and all the air out doors is saturated (and it will draw moisture wherever it can find it— from the snow, if there is snow on the ground), it contains one drop per cubic foot, and when raised to 25°, it contains only 2 drops (1/4th of what it can hold) per cubic foot, so that when it comes in contact with the lungs, it is thirsty for water, and so it rapidly carries off the moisture and the poisons of the body through the lungs and skin, and lowers the temperature of the body. So this dry air is very cooling and grateful to the feverish patient,--and not only is it very grateful, but it is very strengthening--very tonic. Why? Because it carries off the poisons of the body and purifies the blood; it readily takes up a large amount of moisture, and also the impurities which the moisture contains, which is thus carried away from the body. This air which has been warmed from 0° up to 50° now contains three additional drops of water. The air seemed very dry, and it might be supposed that it would be too dry if it were heated; but it is not the heating that dries the air, as many suppose; they think the furnace dries the air when it heats it, but this is a mistake; the furnace does not dry the temperature, but it raises the temperature, and thus it increases (and creates) the demand for moisture.

(We see then, that the changing conditions of the atmosphere, as regards moisture, have a far-reaching effect upon the body. We cannot feel so well in damp weather as in dry weather. ~~How~~ A person subject to rheumatism suffers more in damp weather ~~here is a rheumatic : What makes him rheumatic ? It~~ is because ~~there are certain~~ of the poisons which have been retained in the body, and ~~and these poisons~~ it are irritating certain portions of the body, there are little delicate tissues covering the surface of the brain, and which connect with the tendons and limbs and various portions of the body. Now, in damp weather, the skin and the lungs are less active than before; the skin cannot carry off so much moisture, and the lungs cannot breathe out so much moisture, and so these poisons are retained in the body. Now, if this person has a liver which is healthy enough to destroy these poisons which are retained, no harm will be done, --but there is more work thrown upon the liver by this accumulation of poisons . Now the liver is capable of doing more work than is required of it for every day use,--the liver and kidneys are both capable of doing much more than ordinary work, if in a healthy state,--they can do two or three times as much work as is ordinarily required of them. It has been shown by experiments, that, although the ordinary secretions of the kidneys is three pounds. in 24 hours, yet the kidneys have been known to secrete 28 pounds in that time. The ordinary elimination of solids through the kidneys is only from 25 or 30 to 40 or 50 grammes, and yet this secretion may be increased to 600 or 700 grammes,--I have seen such cases. So it

is plain that the kidneys are capable of doing much more work than is ordinarily required of them. Now (as I have said), if the kidneys and the liver are intact, they are able to make up for the extra work required. When the weather is damp, and the skin and lungs cannot do as much eliminative work as they should do, the kidneys and the liver will destroy and eliminate more poisons .

Now suppose a person is injured by the use of condiments, tobacco, meat-eating, etc.: It imposes upon the liver a large amount of this poison destroying business to do,--that is one of the great works of the liver. Now suppose the liver has been taxed to its utmost capacity, by the person eating what he should not eat,--old cheese, old meat with poisonous ptomaines, the game, or the haut gout (as the French call it). Thus we take in a large amount of poisons which the liver must remove. In consequence of taking in indigestible food, we have rotting substances , gases, rotting substances, and poisonous substances a fetor and unhealthy odor to be inspected to the whole system; the liver has been taxed to its utmost capacity, and now it is overtaxed by these poisons which are being continually taken with indigestible food. Now let this person experience a little change of weather so that the skin does not do its ordinary work, and the lungs cannot do as much work as usual in consequence of the atmosphere being saturated with moisture. ~~The consequence of this is, that more work goes to the liver and kidneys,~~ In consequence of these poisons remaining in the body which should have been thrown off by the lungs and skin, more work is put upon the liver and kidneys and if these organs are not vigorous enough ~~the lungs and skin are unable~~ to do this extra work, ~~the~~ the ~~new~~ person

has an attack of rheumatism. Why ? Because nature wants to save his life, and so these poisons which remain in the body, instead of attacking the heart and setting up an inflammation there and doing their destructive work there, are sent in another direction,--nature sacrifices the large joints of the body--generally the knees, for we can get along without the knees, but we need our hands and elbows very much to eat with, and so the rheumatism almost always goes to the knees; nature is a kind and indulgent mother to us,--she first administers to us the mildest form of punishment, and if that is not sufficient, she sends upon us punishment which is more severe, and, although she is not always systematic, yet it looks as though there was a general plan of this kind. Sometimes when a person has an attack of rheumatism, the heart is affected. It is generally believed that there are two kinds of rheumatism, - one, a physiological rheumatism, and another kind of rheumatism which comes by infection,--which is produced by poisons generated by certain germs which get into the body; the modus operandi is not very different in the two kinds of rheumatism, but one case is produced by poisons produced as the result of unhygienic conditions, while the other results from the action of germs in the body producing poisons and ptomaines. This infectious form of rheumatism is the one which is the most likely to affect the heart. The other form is more likely to assume a sub-acute or chronic form. It omits the heart and affects the large joints at first, and then the smaller joints and lets the heart escape. Now (as I said) poisons accumulate in the tissue surfaces, and we have

inflammation set up there, and then we have rheumatism. Now it is not the weather,primarily, which produces rheumatism; but the over-work of the liver and kidneys (the skin also has not had as much stimulation by baths as it should have), --- the weakness of these organs by reason of over-work, in connection with these changes of the weather, --it is this which prepares the way for rheumatism, and rheumatism is the conclusion of the matter. It is these accidental circumstances which prepare the way for rheumatism, but it is by the merciful arrangement of nature, that the patient is enabled to live under the hampered conditions in he has been left by them.

Why do rheumatics suffer by reason of the condition of the weather? There are great changes of temperature, and of the atmosphere. Now which is the season of the year when rheumatism becomes most frequent ? The majority of people would say, "In the spring or when winter is breaking up. That is a great mistake; the month of the year when rheumatism is most frequent, is August. Why is that ? Because August is the warmest month, and there is the greatest change of temperature in that month, --and the greatest difference between day and night also. For example: we have a change of weather in the month of August every day--even in countries where the atmosphere is the most equable; we have a change of weather every 24 hours; we have day and night weather every day. We cannot find a spot on earth where there is not a change of weather, but in August there are the greatest changes,-

the temperature frequently rises to 100°, where the air can contain 16 drops of water to the cubic foot of air. So, during the warm days, the air becomes saturated with moisture,--all the water it can possibly hold. Now suppose that during the night, the temperature falls to 75°, when the air can contain only 12 drops of water to the cubic foot, and the other 4 drops must fall out upon the ground, the grass, the leaves or the side-walk,--this is what makes the dew. But these drops not only fall out-doors, but the moisture falls in-doors,--it drops in the bedding, the clothing--everything in-doors. In consequence of this, we have damp clothing--everything is damp--and we have a saturated air to breathe at night. In the day time when the air was completely saturated with water (holding 12 drops to the cubic foot), the air seemed hot and "close". In a Turkish bath, with the temperature at 100° we would not consider it warm enough; this is because the air is dry. This saturated condition of the atmosphere fills our lungs with moisture, we get chilled, and then the action of the lungs and skin is lessened, and more work is thrown upon the liver , and as the result of these rapidly changing conditions of the weather , we have more rheumatism in August than in any other month of the year . Why is it that the rheumatic knows when these changes are coming on ? He says, "I know there is going to be a storm, by the way my joints begin to ache,- and my elbow joint gets so stiff that I can hardly move my arm", or "my knees get so stiff that I can hardly walk; I know there is going to be a change of weather ." Why is that ? It is because these atmospheric

changes which affect the body, precede changes of weather . The clouds are created by the atmosphere; they are made up of very fine drops of water, so small that the cohesion of the air buoys them up and carries them along . When the temperature is high, this moisture is taken up, wherever it is found, until the air is saturated with it, and when the atmosphere is saturated with water and breathed in by the rheumatic who has weak lungs and liver, it increases their labor, and the pains of rheumatism, so that these rheumatics can predict something about when the weather is going to change. This is the case in that form of rheumatism which is caused by the action of tissue poisons in the joints.

You can readily see, from these remarks that I have been making, that the influence of the weather upon the body must be very great. (These ~~changes of weather, occurring as they do, every day must~~ various atmospheric changes affect every physiological function . The body is at work all the time, adjusting itself to these changing conditions.) The thermal centers of the brain, and the vaso-motor centers are all at work all the time, controling, adjusting and interacting, so as to keep the body in as normal a state as possible, and consequently, every person, no matter how strong, is affected more or less by these changes of weather. If we are able to make these adjustments quickly, we don't notice any influence ~~influence~~ of the weather. It is with us exactly as it is with a clock that has a "compemsating pendulum", as it is called. This kind of clock is not much affected by the weather; but the ordinary clock is affected by the weather; when the weather gets cold, the pendulum

contracts a little, and the clock goes too fast, because the rate of movement depended upon the length of the pendulum,--the clock goes ~~too~~ fast with a short pendulum, and slow with a long pendulum, so that the clock varies in a slight degree with the rate at which the pendulum swings, so it gains time in cold weather, and loses time in warm weather ,unless there is some compensation for the influence of the weather; so we have what is called "the compensating pendulum", which is a pendulum so arranged that when one part elongates, the other part contracts, and in that way we have a pendulum the same length all the time. So this kind of clock is very nearly self-regulating. Now the body has arrangements very similar to those of this clock--self-regulated: when the skin acts less, the lungs and kidneys act more. That is the reason the urinary secretions are highly colored in warm, cloudy weather, and lighter colored in cool, dry weather.

But these adjustments require a continual expenditure of force and vitality on the part of the body, and, as a result of this expenditure, ~~and~~ one is weak and feeble and the weather is very changeable, he may become exhausted by these changes,-- he may find it impossible to make these adjustments of the body fast enough to meet these changes, and should be sent to a climate where these changes are as slight as possible--although there is no climate where the weather is equable. Next Friday I will talk to you about hot and cold weather,--about the influence of a high temperature upon the body, and how the influence of a low temperature affects the body; and perhaps I will have a few experi-

ments to illustrate the subject.

Used for G. Health.

SANITARIUM LECTURES. (Oct. 31, 1891.)

J. H. KELLOGG, M. D.

PHYSICAL INFLUENCE OF THE WEATHER.

-----XXX-----

p. 5.

Good Morning, Ladies and Gentlemen: I believe I was talking about the weather last week. "The weather" is an almost ineshaustible topic of conversation. I find people always ready to talk about the weather,--always ready to say something about the weather--even if they have nothing particularly new to say. When I say anything about the weather, I always remark, "What nice weather it is,"-- I also say, "What a beautiful day this is." I never like to have anybody try to convince me that it is a bad day. When people get to complaining about the weather, they are very likely to live in a very doleful state all the while. If a person gets the impression that he is going to be either happy or miserable with every change of the weather, he will find opportunity to be miserable most of the time, for it is a very rare thing that a man finds a day that he can't find fault with, and it is very rare that there comes a perfect day; these days are so very rare, indeed, that if we hang our happiness upon the weather, we shall be in a very unfortunate and miserable state of mind most of the time. The fact is, there is no weather that is so bad but that we can be benefited by it, if we choose to be. But I will talk about that part of the weather, some other time. The actual physical influence of the weather upon the body, is the subject that interests us now.

I believe, in the last talk I gave you upon this subject, we were discussing the effects of temperature,--or rather, we had just gotten to that part of the subject--the influence of temperature upon the body. We learned something about the influence of moisture, and I endeavored to show you how the varying states of the atmosphere require constant adjustments of the body to these conditions; that, in the kidneys and the lungs were less active in warm damp weather, the skin is more active, and how, in cold weather, the skin is less active, and the lungs are more active, and how, in consequence of an unusual amount of moisture in the atmosphere, persons are likely to suffer from rheumatic and neuralgic pains. Now let us observe what the influence of the temperature is upon the air, and upon the body.

In the first place, temperature affects the air itself, and through that, it affects the body. Let us see what this influence of the temperature is upon the air. As we have learned something about the influence of moisture upon the air, we will better understand that part of the subject, perhaps, if we will consider what influence temperature has upon the moisture of the air,--and I think I have already explained to you something about that ;--but we will review, for a moment ; I think I called your attention to the fact that a single cubic foot of air at zero temperature, contains about one drop of water . (Explaining on blackboard.) Now at 25°, that same cubic foot of air is capable of containing (that is, if it contains all the water which it is capable of ab-

sorbing), twice as much, or 2 drops. The same cubic foot of air, if its temperature is raised to 50° is capable of containing 4 drops; if we again raise the temperature of this cubic foot of air to 75 , it will contain 8 drops; if raised to 100, the same volume of air will contain 16 drops of water. What becomes of this water, if the temperature of the air is lowered ? This varying capacity of air for containing water at different temperatures explains the phenomena of rain and cloud. You will see a little cloud begin to appear in the sky on a summer's day, perhaps not larger than a man's hand; pretty soon you see it begins to grow, and it gets larger and larger,--not by accumulations from other clouds, for there are no other clouds about it --but the cloud is off alone, overhead, in a clear day. Now what forms that cloud? It is produced by two currents of air coming in contact, one current of air being cooler than the other; one current of air is saturated with moisture, and the other current has a lower temperature, and contains less water. This warm air, saturated with moisture, coming in contact with the cooler air, lowers the temperature of the warm current, and raises the temperature of the cool current, and then, the average temperature of the combined currents being less than 75° some of the moisture must drop out. For instance, this volume of air at a temperature of 100°, and containing 16 dropsof water, coming in contact with a volume of air at 50°, will produce two volumes of air whose temperature is 75°,--that being the mean between 75° and 100°; add these together, and we have a combined volume of air, the tempera-

ture of which is 75°. Now air at 75° is capable of holding only 8 drops of water; but (referring to diagram), before the two atmospheres came together, we had 16 drops to the cubic foot in this, and 4 drops to the cubic foot in that volume of air. Now this volume of water is lowered to 75°, and this volume is raised to 75°. Taking 8 drops from the 16 drops leaves 8 drops, and this current of air being raised from 50 to 75 holds 8 drops.—8+8=16; so the combined currents now contain only 16 drops of water, whereas before they came together they contained 16 + 4 = 20 drops. So that when these two columns of air combine, the difference between 20 drops and 16 drops per cubic foot, which is 4 drops, must fall out, and thus we have 4 drops of fine rain produced under these circumstances, per cubic foot of air. Of course we do not ordinarily have such extremes of temperature; ordinarily the temperature is from 50° to 75° or from 60° to 75°; but a saturated atmosphere, whenever it comes in contact with a cooler atmosphere (no matter what the temperatures are, provided one is cooler than then the other), must drop out some of its moisture in fine rain. This thing happens every night in summer time; when it happens in the fall, it produces frost. Frost and dew and rain are all the result of the operation of this principle which I have explained to you.

You see then, that when the temperature of the air falls, the air becomes dryer; the air seems dryer and moister, both-- it seems to us to be more moist, at the same time that it is dryer. But you see here, why we have one of the marked causes of the

difference betwen summer and winter. Summer air is always damp (except in the desert). The air gathers moisture, wherever there is green foliage streams or any other source of moisture for the air to come in contact with,--wherever it can find moisture, it will drink it up, it has such a thirst for moisture. But in the winter time, the moisture is frozen out of the air; in winter, the lowered temperature causes the moisture which had been deposited as rain, to be deposited as snow and frost; the lowered temperature of the air lessens the avidity with which it licks up the moisture in summer time, consequently we have less moisture in the air in the winter than in the summer time. So that, at zero, we have only 1/16th as much moisture as on a hot summer's day--just before a rain, for example--when the air seems very close moist, damp and suffocating; one can hardly breathe an atmosphere of 100; in a moist atmosphere we cannot make much exertion without being distressed, because the lungs are congested, and the skin cannot properly perform its functions, and one is very much fatigued by a very slight exertion; whereas at zero, when there is but little moisture in the air, the lungs are so vigorous that we have no embarrassment while at work. So we find that temperature has a very marked influence upon the atmosphere, as regards the amount of moisture it contains, and thus it influences the body in a way which I have already explained to you, in a former talk.

(Now there is another ~~matter~~ thing which is of interest to us, in connection with the influence of the temperature upon the air;-

~~which is,~~ the amount of oxygen that it contains.) Air varies in volume, according to its temperature.--

Q (A lady.) What is the difference between oxygen and ozone ?

A. It is oxygen (O_3). Ordinarily, of oxygen the air contains about 20 parts to the hundred--about 1/5th of its total volume; in 100 parts of air, we have about 20 parts of oxygen and about 80 parts of nitrogen. Now (the oxygen is the vitalizing part of the air; it is the oxygen which supports the fire of the heart; it is the oxygen which produces oxydization; it is oxygen which supports the life of plants; it is oxygen which supports all animal life, and which supports the burning of the candle, and of the lamp.) That is the reason the candle or the lamp will burn low sometimes in a dense atmosphere. It is a very common experiment to light a candle and hold it in a well, in order to find out whether there is any bad air in there, so as to determine whether it would be safe to go down there. It is necessary, however, that there should be carbonic acid gas or "choke-damp" ~~present~~, in order that miners etc., can inhale the air with safety. I must tell you of a sad case which occurred not long ago, in consequence of negligence,--or of want of knowledge of this fact. A person who had heard of the candle experiment being used for the purpose of determining whether gas was present, had it for his duty to explore a large vault containing gasoline, and he wanted to know whether it was safe for him to go down there; so he bent over the large hole through which he expected to go down,--if it was safe for

him to do so, and he let his lantern down inside of the hole, to see whether the lantern would burn or not; if the lantern went out, he expected to have to ventilate the vault before he went down into it ; well, the lantern went out,--and he went out also--for there was a tremendous explosion occurred while he was leaning over the hole holding his lantern in it, and he was blown out and terribly burned. I have known that accident to occur twice, for want of the knowledge of the fact that it is only choke-damp, or carbonic acid gas, which will extinguish a flame. But I only mention this incidentally. It is oxygen that supports combustion of every sort. Most of our lights are due to combustion of oxygen. Most forms of electricity depend upon oxygen; we do not have any oxygen in the electrical light lamp; there we have no combustion,--if we did, the little carbon filament in the lamp would be consumed; but the air is all pumped out, and then this little filament which is put in the lamp can be heated to a white heat, and it will last for months. They usually burn from 800 to 1000 hours,--they burn for a long time, because there is so little oxygen left. But the carbon filament gradually dimin ishes, until it finally snaps and is worthless. So the amount of oxygen determines the activity of combustion. In the electrical lamp, there is practically no combustion, the amount is so small; or, at any rate, there would be as much combustion in a second of time, if this little filament in the electrical lamp were exposed to a volume of air, as there would in many days if it were not. Ordinarily, there is a volume of oxygen in the air; and this

same state of thing prevails, no matter what the condition of the air is--whether rarefied or dense. But you can see that this 20 cubic inches of oxygen which is found in 100 cubic inches of air, would, if diluted, be of less value to us, than if condensed; a quart of diluted oxygen would be of less value than a quart of condensed oxygen. It is the same with milk; the fresh milk, after it has been skimmed two or three times, it gets blue and very innutritious. So, with oxygen; after it has been diluted, there is left but little of the life-giving force which it ordinarily contains.

Now let us see what relation temperature has to this fact. Suppose we have here, a given volume of air; we will raise the temperature one degree. This volume of air increases about 1/500th of its volume for every degree of temperature; that is not very much, but suppose we raise the temperature 100°; then you see we will have an increase of 1/5th of the volume of air. So that, when the temperature of any volume of air has been increased 100°, that volume of air has been increased in volume (that is, a given quantity of air), about one fifth. Now our lungs have only a certain breathing capacity, and you can see that with the lungs full of such air, we would receive less benefit, than if the lungs were filled with undiluted air.--air which was condensed. The effect of the application of heat to the air, has the effect of diluting the oxygen which it contains. It is for this reason that when we are on the top of a mountain, and try to breathe the

air we find it difficult to do so. You know how easily ~~we get~~ one gets out of breath while climbing a mountain ~~and how quickly we get out of breath when we come on the top of a mountain.~~ and even after the top is reached. That is because the air is so thin; that is, there is so little oxygen in the air. Now this principle applies in changes of temperature; when the air is warm, it is rarefied, and the oxygen is present--not in less proportion to air, but in less proportion to a given quantity of this rarefied air. So, cold air is denser and more invigorating and life-giving than warm air, which has been diluted by heat. That is the reason why the fire on the hearth burns brighter as cold weather comes on.) ~~We say, "Winter is coming",~~ when the coals glow brightly on the hearth, but we should not say, "Winter is coming", then, but "Winter is come". Why is it that the fire glows brightly in cold weather? (There is ~~Because there is~~ more oxygen present than in warm weather.) There is a little spark on the end of a match, and after it has been once lighted, if we should dip it into pure oxygen (which is a condensed form of oxygen), ~~and~~ it will immediately strike up a flame again. This is because (and the oxygen ~~which is present~~ stimulates combustion.) So, in winter we see the coals glowing with greater intensity than in summer, because there is more oxygen present. (Now at the same time when the fires on the hearth are burning more brightly, the vital fires in our bodies are also burning with greater vigor Thousands of people make a great mistake in running away from cold weather. Cold weather is one of the best of tonics, ~~one of the~~

~~most invigorating of tonics. Why?~~ Because we get more oxygen ~~in cold weather~~ than in warm weather. ~~We couldn't live more than five minutes without oxygen, and~~ the more oxygen we take into our bodies, the more intense is our life. The activities of animals are regulated by the amount of oxygen they breathe,--for example, (making diagram), here is a frog, which has for its lungs, simply a pair of bags or sacks in its body; it has a little tube or bag down here--like that; it don't have the vast number of little muscles and subdivisions in its lungs that we have, but simply a bag on each side; it has no thorax through which to breathe, and no diaphragm; it has no ribs to act as levers for prying the walls or sides of the body in and out,--it has no breathing bellows as we have, so it has to drink air, just as we drink water . If he wants to drink air, he will empty his air-bag as he comes up to the surface of the water (you will see a few bubbles as he comes up), and if you watch him, you will see him stick his nose out of the water, and then you will see his throat move back and forth, and if you watch the end of his nose, you will see the little openings there open and shut, as he expands the throat. These little valves open, and he takes a big mouthful of air and then the little valves close, and he swallows the air. We have a little valve at the back of the throat which closes the nostrils when we swallow water, but the frog has a valve for each nostril. This swallowing of air is a slow process on the part of the frog, but it is not so with us. Suppose you

put your head under water,--you would want to take it out again in less than a minute, in order to breathe. You would soon die if you couldn't take air rapidly, but the frog gets along very comfortably for a long time without breathing,--indeed he gets along so readily and so easily with his limited respiratory capacity, that when the physiologist takes out his lungs, the frog hops off, and is really very comfortable without them,--it does not amount to much with him, for he will live several days without any lungs at all--and sometimes he will live a longer time than that without lungs (provided care is taken in removing them), because he gets along with what he can breathe through his skin, through which he does about 1/7th of his breathing ., while with us, only about 1/50th of the breathing work is done by the skin. Our skins are just as good breathing organs as those of the frogs, but we have so much more breathing to do than the frogs, that we can breathe only 1/50th of it through the skin. Now see the bird: it has to make movements in the air; it has to fly long distances; it must have the lung-capacity that a long-distance runner has . A man who had lost one lung could never undertake competition as a long-distance runner or sprinter; he couldn't run 50 rods without tiring. The bird has to be prepared for a tremendous amount of lung-work and the expenditure of a great amount of energy, so it must be prepared for the reception of a large amount of oxygen. Doubtless you have sometimes noticed, while riding in the cars, going at the rate of 85 or 90 feet in a second (which is a tremendous velocity), you have looked out

of the window and seen a little bird sailing along (a bird or a dragon-fly, perhaps), it is keeping up with you with perfect ease, apparently without moving ~~moving~~ its wings,--it is sailing along at the same rate ~~w~~ at which you are going--a mile in a minute or more. At what a tremendous rate does a bird or a fly go through space. So the bird has great lung capacity; it has a large throat, chest, thorax, breast and clavicle. That is why the bird has such a large "wish-bone"; we don't find them so large, except in birds which have to make long flights . Not only has the bird, great lung-capacity, but nature has made their bones hollow, and these communicate with the lungs, and the lung -capacity is increased by connection with the bones.--

Q.(A lady.) Why does a frog live so long, when buried in rocks, --as I have heard they do ?

A. I suppose these are cases of "suspended animation!" I don't believe in that theory, however, although some people do; but we won't have any quarrel about that. It must be a case of suspended animation, if it is true, for the animal does not breathe. The frog goes down in the mud and freezes up for three or four months during the winter. Now I want you to compare the life of the bird with its rapid movements of wing and its sprightly habits of life in the atmosphere, with the frog who lives in the slime and mud and water frozen up, dormant for three or four months of the year, and then hopping out as lively as ever in the spring (but still, not very lively), compare this slow frog that will sit on a log for hours and hours on a long summer's day, and then slowly

jump into the slime again. This slow life of the frog is due to the slight amount of oxygen which it breathes, while the different life of the bird is due, largely to the great amount of oxygen which it breathes. So the intensity and character of our lives depends upon the amount of oxygen which we take into our bodies. That is why we feel brighter and clearer, and live on a little higher plane, and have more energy in cool weather than in warm weather. We see the difference between people living in cold climates and those living in warm climates. The people living in a temperate climate are vigorous people--they rule the world. This is what gives the people of England the dominance over the people of India; a few Englishmen are able to rule millions of Hindoos, chiefly because they have been raised in a cooler atmosphere. ~~their bodies have become firm and hardy.~~ The ancient Britons were so hardy that they got along very well without other clothes than paint and a string of beads. ~~They went~~ about in the forests, where they gathered nuts and the roots and herbs upo which they lived. ~~their skins were as hard as those of~~ the animals with whom they associated. The men were strong, hardy ~~and vigorous,--although, unfortunately, they were cannibals,--our~~ ancestry was a very bad one, although the men were very strong and vigorous. That is the reason they were able to rule those more feeble and less vigorously developed natives of the tropical climates. This difference is caused by the difference in the air they breathe. Of course, if we go too far North, among where we

~~fied~~ the Laplanders and the natives of the Arctic regions; ~~there,~~ ~~we find that~~ the cold is so great, that it is not compensated by the oxygen which they receive, and they live under such miserable conditions, in order to protect themselves from the cold, shutting themselves up in their huts without a particle of ventilation, still they manage to live, because the poisons from their lungs are condensed upon the cold walls of the huts in which they live, which protect them in some degree from these poisonous substances.

One word more in reference to the great mistake which is made by man in running away from cold weather: Nature gives us the changes of weather as a tonic; ~~she gives us these changes~~ afforded by the different seasons as a sort of vital gymnastics ~~to stir us up~~. By these changes of temperature ~~which the seasons bring us~~, we put on a new constitution; ~~our old constitution must be reconstructed;~~ and nature regulates the vital processes of the body so as to keep up the right amount of heat, and to enable the body to carry off the right amount of moisture and thus eliminate, to some extent, the poisons of the body. So, in Summer we have a long Turkish bath and then ~~have~~ an opportunity to cool off; then we come up to ~~Fall~~ the cooler weather of Autumn for reconstruction. During the Summer, ~~we have been~~ the body has been eliminating the waste material, and getting in a condition for rebuilding; and then by the cooling of the air, the process of tissue-building is stimulated, ~~and tissue is being built up, the germs being frozen up during the Winter;~~ the result is, with all these advantages, and with a highly oxygenated air, we build up stronger

and better bodies. People feel better in cool weather than in warm weather~~, this is in consequence~~ because of this rejuvenating process--the rebuilding of the body. When the first warm days of Spring come, ~~the doctor knows he is going to be busy.~~ Many ~~my~~ people feel relaxed and debilitated~~, by this Spring weather~~". Then ~~the Spring sicknesses~~ come out, and the doctor has plenty to ~~do~~. That is because we suffer temporarily from a certain withdrawal of these tonic atmospheric influences to which we have been ~~subjected~~ accustomed during the winter.) So I think (as I have said), invalids make a great mistake in running away from cold weather, for this cold weather is a great panacea for a number of ills,--for biliousness, torpidity of the liver, impurity of the blood, etc.

This cool weather is the best of tonics;--there is no blood-purifier equal to oxygen, which is nature's purifier. Oxygen, pure air and pure ~~weather~~ are the great agencies by which the body can be purified;--and really, there is no other means by which impure blood can be made pure, -and cold weather is the best condition for this work.

Now a word about sunshine: (Sunshine is ~~one~~ another of the elements of the weather ~~(I think I will have~~ to devote another talk to ~~sunshine).~~ and it is one of ~~nature's~~ the most potent of life-giving agents. (In the dark ~~there is~~ nothing grows but mould and a few fungi, ~~but animal life is always the most puny in the dark.~~) Most forms of vegetable life develop very poorly in the dark,--the potato, for instance will be small and white, if grown in the

shade. (Vegetables raised in the dark, are always colorless; animals also, which are raised in the shade, are always colorless. ~~Some of you have seen~~ The Mammoth Cave fish, ~~--the blind fish that swim around in the water there--they~~ are colorless, and blind; ~~as you know, they have no eyes (except rudimentary eyes),~~ their eyes have gradually disappeared for want of use. The same principle applies to ~~our bodies;~~ human beings men who work in the mines for a long time become pale.) It is somewhat distressing to observe those miners and see how pale they are, because of their long work under ground. I was at the Mammoth Cave a number of years ago, and met a man who had witnessed some experiments which had been made there before that time. The air of the Mammoth Cave is found to be of a very uniform temperature, and remarkably dry; it is lower in temperature than on the outside, and consequently the air is dryer--some parts of it, at any rate. The idea was conceived by some - body many years ago, that a consumptive could live in a perfectly equable atmosphere; it was claimed that if a consumptive could have a perfectly uniform temperature in which to live, he could get well. So a whole lot of consumptives moved into the Mammoth Cave,--and I saw their cottages afterwards (or rather the ruins of them,--and some of you have seen them), the little huts where they lived there in the Cave for some months. But when these poor consumptives came out of the Cave, they looked ghastly,--the man who saw them, told me they were as white as sheets, and their skins seemed to be absolutely bloodless and colorless , and the consequence was, that they died off very rapidly after that .

Their going away from the sun was a very great fallacy. Altho' the temperature of the Mammoth Cave was uniform, yet this experiment showed (and other experiments have proved it) most conclusively that human beings cannot live without sunshine. This has also been proved by other experiments,--for instance, among the high Alps : The people who live in the valleys among the high Alps ~~between these mountains are found to be affected~~ are very subject to what is known as "cretinism", a physiological disease by which both the mind and body are affected ~~(and the mind is effected through the body)~~. This is a ~~form of idiocy;~~ The people who are afflicted ~~affected by this mental and physical condition~~ in this way ~~are found to~~ have large goitres, even the children ~~the children also have them~~. I saw a man as I was going along on a mountain road among the Alps a number of years ago, with an enormous goitre hanging down from his throat .. There ~~The women also have goitres~~ sometimes are so large that they hanging down nearly to their waist, ~~in fact it is sometimes considered fashionable to have them~~ and it is sometimes necessary to wear bands around the body ~~in order~~ to support these goitres. Now it is only in these deep valleys, where the sun ~~commences~~ begins to shine about (10) o'clock, and ~~sunset~~ sets comes about half past (2) or (3) in the morning in the afternoon, ~~Feb., or they have but little sunshine.~~ It is only down in these ~~deep gorges~~ that this disease appears. It was formerly ~~first to be~~ attributed to various causes ~~water, then to hard water~~, soft water,--and then to snow-water; but the government finally established hospitals on the tops of some of the mountains, where patients could get sunshine twice as long as before, and it was found that those patients who were moved up there got well, which proved that it is the lack of sunshine which produces this

But because certain conditions to health of the weather are less favorable than others, it is very unwise for us to accentuate them by complaining of the weather. If a person gets the impression that he is to be happy or miserable with every change of the weather, he will find opportunity & the miserable a large share of the time; for it the entirely perfect days are very rare. And the fact is that there is no condition of the weather so unfavorable to the health as a wretched and unhappy state of mind.

Good

condition. ~~The same thing has been observed in other countries.~~ It has been observed In countries where there ~~has been~~ but little sunshine, and a dusky weather that good deal of ~~disease~~ goitres ~~have~~ prevail ~~there~~, but not to so great an extent as in the valleys of the Alps.) Here in various ways it has been found that health cannot thrive

There are two elements of sunshine,--the actinic rays (the chemical part of the sun's rays), and the heat connected with the sunshine. You know sunlight will shine through glass without heating it, but if you place your hand behind the glass, ~~you~~ will you find that the rays are very warm. I have an apparatus and preperation here for the purpose of making a little experiment. I have here a large lens, and I want to show you the focus of this lens. Here is an electrical light (Give me a piece of paper, please); the lens brings the rays to a focus upon this paper. Those of you who can see the paper, can see that the reflector behind the lamp, is pictured on the paper (it is smaller than the mirror),--this is because the rays of light are brought to a focus. Now I will bring it to the window,--here is a picture of the window right upon this paper. If the sun were shining, I could show you another phenomenon here, by adjusting the lens to the right point, and then by bringing all the rays of light to a focus, they would set the paper on fire. A piece of ice made into a lens will also concentrate the rays of the sun so as to produce heat; it is by this means that the Esquimaux sometimes lights his pipe; he simply takes a piece of ice, and whittles out a lens, and then lights his pipe with it, in this way. The light

shines through the ice without heating it; the rays which are concentrated by the ice lens will set a piece of paper on fire, thus showing that they go through the ice without heating it . That is one of the properties of the sun's rays,--they will pass through conductors without heating them--it is heat in the form of radient energy. Heat is propagated by three different means--by means other than by rays of light which travel out from the sun and can be experimented upon with a lens. . I can show it to you on my hand, better than on the paper. Now you can all see the picture of the lamp on my hand, very clearly. I can make it on the blackboard,--now you can all see the picture of the lamp on the blackboard . I have brought the rays near the focus of this lens,--but the picture is not exactly at the focus. Now this is because the rays of light produced here, can be concentrated. The lens is not heated by them, but if the amount of heat was very great when I brought these rays to a focus, I should feel the warmth. So we are able to concentrate the rays of the sun,--and it is proposed by scientists to convert the rays of the sun into radiant heat so as to be able to run steam engines , etc. by this means. Mr. Ericsson, the inventor of the iron-clad Monitor, spent the last 20 years of his life trying to devise some means of running steam engines by means of solar energy,--and he could make it work well when the sun shone, but not very well when the sun did not shine. His problem was, for finding some means of storing up the energy of sunshine, but he found that this climate

was not well adapted to that kind of apparatus. But these rays of light of which I am speaking, have the remarkable property of being able to penetrate non-conductors. Any non-conductor which is transparent to light, allows the rays of light to go through it. If it were dark now, you could see that my fingers would be translucent when I hold them up to this electrical light; this is because the rays of light and heat pass through them. In the same way the sun-rays strike into our bodies, --even into the anterior part of the body. Heat from a stove does not penetrate in this way, to any great extent ; but if we expose ourselves to the radiant heat of the sun, it will pass right through the body, just as it passes through the glass. The living tissues of the body are transparent,--even the bones are, to a very considerable degree transparent. In surgical operations, I have found the muscular tissues wonderfully transparent. When I was a student, I used to examine the muscles of a frog immediately after he had been killed,--they are so transparent that you can look through them,--first rendering them opaque. But in a state of health, the tissues are always almost transparent. By putting a light in the back of the mouth, it illuminates the face ; so that one can see the inner part of the nose, by placing a light in the mouth. I made an experiment, not long ago, by which I discovered that by the application of heat to the abdomen, all the internal organs are illuminated; I found that the light penetrates as far back as the extreme back part of the abdominal cavity,--the whole interior of the abdomen is illuminated, so that it looks as transpa-

parent as the fingers do when you hold them up to the sunshine. It is only the blood-corpuscles that are opaque,--the other parts are transparent. It is not because the sunlight shines through the skin, but it shines through the body,--the bones and the skull, and the interior parts of the body; it is not the effect of the sun-heat on the skin, but it is the sun-light which illumines the brain. That is what ~~sometimes~~ causes sunstroke,--it is the effect of such a degree of sunshine, that it produces a stimulation of the brain--it is the sun shining upon the nerves. If we think of this, when exposing ourselves to the sun, it will lead us to give more attention to sunshine.

In view of what has been said, it is important, also, to look to our clothing. Black clothing is very unhealthful. We should wear white clothing, so as to allow the rays of the sun to penetrate it, for white is transparent. If we had white sheets hung up to the windows, it would be almost as light as it is now .; if the sheets were black, and we hung them up to the windows, it would be so dark in here, that you could see scarcely anything. That is because white is transparent to light, and black is not . Black clothing shuts ~~out~~ the rays of the sun away from our bodies, and then they are in darkness. But if our garments are white, the sun can penetrate them,--and also our bodies. The reason (and it is a curious one, too), that white clothing is better than black, is, because it is both warm and cool. Now this may seem paradoxical, but it is true . In warm weather, we want white-colored clothing, because we find it cooler . Why ?

Because white is a very good reflector. Now in the summer time, what we wish to do, is to protect ourselves from outside heat,-- we don't want to get so much of the outside heat--and we want to get rid of what heat we already have. We want to avoid taking in too much external heat in warm weather. White (as I have said) is a good reflector,--it carries away outside heat, and protects us from it; whereas black is a good absorbent,-,it concentrates the rays of heat. If you take a piece of ice and cover it up with a black blanket or a black cloth, and take another piece of ice and cover it with a white cloth, you will see that ice will keep longer under a white cloth than under a black cloth; the black cloth will soon settle down into the ice, because it absorbs the heat; but it requires a long time for the ice to melt under the white cloth, for white is not an absorbent but a reflector of heat . Now in winter time, we don't depend upon external heat, but we depend upon the preservation of internal heat. So in winter time, white clothing is good for us, for white is a good radiator, and heat is deposited by radiation; whereas black is a good absorber, but a poor radiator . . So white cloth is good to wear both in summer and in winter. "But" you say"we should not wear white, because it will show dirt." That is a good reason for wearing it . Our architects said that we ought not to use white knobs because they would show dirt : I told them that was the reason I had selected them; because, if a knob has dirt on it, we wish to know it. If the knobs were

bronze we should not know when there was dirt on them, and so I wanted white knobs, for white knobs will show the least speck of dirt. Dirt would be visible, in wearing white clothes,--so it is better, every way, to wear white clothing.

"But we do not have sunshine all the time": we have a sun-bath, when the sun comes out; then a cloud comes over it, and the patient waits dismally for the sun to come out, and the sun don't shine, and the patient is disgusted with the bath that he didn't get. Well, we have been looking about for a substitute for sun-baths, and I think we have found it at last in the electrical light bath, which I think is going to prove to be a very great addition to our therapeutic means of health. Experiments made with electrical light show that flowers and vegetables grow and develop under the influence of electrical light just the same as under the influence of sunlight. We can take pictures by means of the electrical light, the same as with sunlight,--the actinic rays and the heat rays are there, the same as in sunlight. We also find that people sometimes suffer from electrical light strokes, just the same as people suffer from sunstroke. All these things put together have made me conclude that there must be in the electrical light, a very powerful therapeutic agency, which acts upon a person like the sun-rays; so we have constructed electrical light batteries by means of which we have used radiant heat, and I am greatly pleased with the results. I have found by experiments that electrical light heat does strike into the human body in a remarkable way. A strong young man was put into one of the electrical light baths with a temperature a little below normal

(78° F), he was put in the bath, and in fifteen minutes his temperature was 101°, and it remained at 101° about five minutes after he was removed from the bath. Now I had never seen such effects from any other bath; I had never seen the temperature rise 3° in so short a time, in a bath. Why was this ? Because the heat of the electrical light strikes into the body,--the radiant energy of the lelectrical light has the power of penetrating the body and raising the temperature of the body. Now, it is not desirable to raise the temperature of the body in this way,- although it is a great stimulus to the vital processes of the body, and, as a rule, the electric light bath is so powerful that is should be administered only for a short time. The heat of the electrical light is different from the heat of dry air and the heat of water which must be carried in by conduction only,--just as heat would be slowly conducted along a pane of glass--you may take a pane of glass or a glass tube that has been exposed to heat, and hold it for a long time by the opposite end, and if it were a piece of iron, you couldn't do that . Why? Because iron is a good conductor of heat, but glass is a non-conductor. So this heat is carried slowly along the skin, because the skin is a non-conductor. But this radiant heat will go wherever light will go; consequently, I think we have, in this electrical light heat, a valuable therapeutic agent; its influence upon the body is very powerful,--and I wonder that this fact has been for so long a time overlooked; This property of the electrical light has only been discovered within the last ~~eight or ten~~ few years . Some

10 or 12 years ago, I began to see the use of solar energy by means of large lenses, and I found means of removing neuralgia and spine aches by the use of lenses and sunlight; but I have never thought, until lately of the use of heat, applying it by reflectors; but when applying it, the effects were very remarkable upon neuralgics, and upon the bones. A fomentation applied on the outside of the body communicates heat, but it is slowly conducted into the body; but when you apply the electrical light (radiant sunlight), that heat travels straight into the body at once; it does not have to be slowly conducted in there but it flashes in like the light itself. It begins to do its work upon the nerve-filaments at once, When applied over the stomach, the temperature of the stomach can be raised to a temperature of 101 in a few minutes, and that temperature is communicated to the whole body. So if we apply this heat to a single part of the body and raise it to a certain temperature, that temperature is communicated to every part of the body, and by this means we may stimulate the vital processes of the different parts of the body as we desire. So, although we have a cloudy day, we may have sunshine stored up in a box, and we can make a local application of it, the same as if we had it directly from the sun. Sunshine has been captured,--sunshine which has been deposited years ago in coal-beds and disintegrated into coal-oil--we can burn it in our furnaces and then re-convert it into electrical light. So we have here shining out before us, sunlight which was consolidated in plants and trees,

centuries and centuries ago, and here it shines out just as powerfully as when it first stimulated the growth of those plants and trees .

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There is one point which I wish to explain to you, in regard to gymnastic exercises . You should study these charts. If you have a line running straight through your chart, that means that you are symmetrically developed,--although it may be that you should be on a higher level; but if your line runs straight through, you are exactly symmetrical--which is not likely; you will probably find a zigzag line up here (referring to chart.) Now I have gone carefully through with each one of these charts; have made a careful study of every single chart that has been made, and I have arranged an exercise prescription for each of them so adapted that it will bring out all the weak points. It is important to follow the prescription exactly. For example, this dip means weak fore-arm reflexors; now you must have exercises to strengthen those, and the prescription states just what you are to do, and just what machines you are to use; the machines and the exercises are numbered in the prescription, and I have noted down in the prescription just what points are weak and what points need to be built up.

I have also added some columns which I was going to show you. This column is "Arms", and this column is "Legs", this column is "Trunk" and this column is "Chest". Now the total strength of

arms is summed up here, legs, here,etc. It is arranged according to the height. In this chart, you start right here, and you find "Arms" marked away down here, and "Legs" up there, and "Chest" lower still. What does that mean ? It means that you have not used your arms enough, and that your legs are disproportionately developed, as compared to your arms. You have perhaps been a good walker. . I have been comparing these totals. With women, the muscles of the arms are weak. Women don't use their arms by such strong exercise as men. The proportion of strength of arms to legs, is as 1 to 2 ; in men the proportion is as 2 to 3. This shows that women don't use their arms enough: their shoulders also are imperfectly developed. The reason of this is, that they have not had a fair chance, on account of their clothing. The clothing which is tight about the waist, prevents the action of the trunk, and these muscles which control the arms to some extent, run out from the sides here, so that the arm-muscles are connected with the trunk, and if the arm is weak the trunk will be weak.

Now these charts and the exercise-prescriptions are ready, so you can start off in the gymnasium exercises at any time. The very weakest one can take some exercise. We have six different grades of prescriptions, besides all these minor modifications. I have arranged a set of exercises for those in wheel-chairs, and they can take them all without going out of the chairs; and from that, all the way up to the strongest man here,--we can give you

all work enough to do in the gymnasium.

I hope none of you will be afraid to take the exercises. One lady who has been trying them, was very much encouraged. Said she "I have taken two of the exercises, and when I had got through, my arm was so sore that I wouldn't go through with the exercise again for anything." I told her that was just what I expected; that that was not only an evidence that she needed the exercises, but that it was a very encouraging evidence that she was going to have larger and stringer muscles, so she should be encouraged. What is that lameness ? It is the first process by which the muscles of the arm are going to be made stronger,-- that is what it is, exactly. In order that the muscles may be made stronger, there must be more blood brought in ~~there~~, and, in order to get more blood ~~there~~, the muscle must be larger. So nature dilates the muscle and brings in more blood, and the blood-vessels are so small that they are strained by the amount of blood that is brought in, and all the tissues are compressed, and there is congestion and discomfort there. Now that feeling passes off, when the tissues become accustomed to it, and the muscles remain when the blood comes in. But the muscle cannot grow without more blood. If the muscles have only a partial supply of blood, they will remain in a state of weakness; but if we stretch the muscle by exercise so that more blood is brought in and the muscle becomes congested, it will by and by result in growth of the muscles and strength of the arm. So (as I said) , this feeling of lameness

which attends the first attempts at exercise is a warning thing,--it means that the muscle is by and by going to be stronger. Take light exercises now, and then you can go back through the prescription. There are many of you who could double your strngth in two weeks. There is scarcely a one of you, but what in a few months could double your strength and muscular efficiency. Charts brought in.)

I have found it very interesting to compare totals, and I find that the total strength of the strongest woman whose strength has been tested in the Institution here— the total strength was nearly 6000 lbs.,--nearly three tons--the strongest woman lifted nearly three tons. Of course she didn't lift three tons at once, but the total strngth of her muscles was three tons--adding together all the different groups of muscles. The total strength of the weakest woman was 500 lbs., and the medium was as 1 to 6. I think the total strength of the strongest man was a couple of tons more. You should get your strength tested, and then you will know what it is, and then you can watch the increase of the total strength, and this means just that increase of strength which give vigor and efficiency for any and every useful line of work.

SANITARIUM LECTURES . (Nov. 12,1891).

J. H. KELLOGG, M. D.

T H E W E A T H E R . (Pt. II.)

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Good Morning, Ladies and Gentlemen : We have been having such delightful weather during the last few days, that I think it would be in place to say a few more words about "The Weather ."

The only way in which we can absolutely uniform weather, is by shutting ourselves up in a room somewhere, and regulating the meteorological conditions artificially. It is possible to make artificial weather,-- an artificial climate; this has been attempted to some extent. I made quite extensive experiments in this matter several years ago; I found that it was quite possible to regulate the temperature of a room,--to regulate the moisture of a room; it may be even possible to regulate the electrical conditions of a room. We make some attempts of this kind in our house here; when the house is closed, the temperature can be regulated quite closely. We put up our storm-windows , and we have in the basement for the purpose of regulating our temperature, three large heating-rooms, each with more than 1000 square feet of heat-surface --about 1200 square feet of heat-surface in each room. We have, in connection with these, the means of moistening the air by a steam-chest which is a matter of considerable importance,--and it will also be possible to have electrical appliances by mean of which the electrical states of the air can be closely regulated.

Just a word now, in reference to the artificial method of regulating atmospheric conditions (referring to diagram), artificial regulations of temperature: What is the proper temperature which should be maintained ? The ordinary temperature--the average temperature of the most salubrious climates--may be said to be about that of June; the month of June has an average temperature of about 60°. In England, the temperature of public houses, public rooms and hospitals, is maintained at about 60°; it is rare to find it higher; even in some hospitals where one would think the temperature should be higher, I found it to be 52°; and in the large bath establishments, in the cooling-rooms or dressing rooms, I never saw the temperature over 70°. In Vienna, and some other places in continental Europe, I found the temperature of their bath-rooms as low as 50°. I am sure you would all come into the office complaining of having taken cold in the bath-room if the temperature of our bath-rooms were as low as that . Americans do not seem to be able to endure as low a temperature as Europeans. I have observed that those people who get nearest the North Pole--who enjoy exploring in that region mostly--are Europeans; Scandinavians, I think perhaps, have performed the greatest feats in this direction. I am quite certain, however, that we accustom ourselves to too high a temperature--especially in cold weather. In summer-time, when the temperature is from 85° to 90°, we think the weather quite oppressive, but I have, not infrequently, in the winter-time found patients in rooms with the

temperature at 85°,--and very often at 80°--and sometimes as high as 90°. We very frequently see people, when cold weather begins to come on, begin to hug the stove (almost literally),--they draw closer and closer and closer to a big roaring fire in the stove or in a glowing fire on the hearth. We find people (particularly in the winter-time), almost living in the chimney-corner,--those old-fashioned chimney-corners--we don't often see them now-a-days; they are made high enough enough and large enough, so that there is room enough for a chair inside of them by the fire. One sometimes sees them in English houses at the present time. Small fire-places are put in some modern houses, because they are considered "antique". The craze for this fire-place is becoming quite general,--and they are really very cosy looking fires when started, but they must be extremely unwholesome. This getting so close to the fire and accustoming one's self to ~~the~~ heat, lessens the ability to withstand cold; When cold weather comes, such people will complain of cold, and they will toast their feet on a hot coil, hug the stove, or roast their feet over the register; their feet will be cold at night, so they have to take a jug of hot water, or a hot soap-stone, or a hot flat-iron or a hot brick to bed with them, and the consequence is that the feet are debilitated, and their ability for keeping themselves warm is lessened more and more, until they become quite unable to take care of themselves and require a great amount of this artificial aid continually. So if you want to have cold feet, just begin at this season

of the year by toasting them over a register or roasting them before the fire; the feet will very soon lose their ability to keep warm. The feet should be educated to keep themselves warm; our hands, in general, should be educated to keep themselves warm. The habit of living in too high a temperature has the effect of producing debility. I think you can very readily see how debility is the natural result of living in too high temperature.

When the temperature is high, we require less material for producing heat in our bodies, than in low temperature,--in other words, we require less food in a high, than in a low temperature. So nature takes away, ~~in some degree,~~ our appetite, in some degree, in a high temperature, so that we shall not take a surplus of food; all the surplus food that we take when we are living in a high temperature (or at any time, for that matter), all the surplus food we take, must be eliminated through the kidneys,--unless it is deposited in fat--and it is not every one who has the ability to deposit adipose tissue in that way, to any great extent; all the surplus food, if digested, must be carried off through the kidneys like so much waste matter. In this way, there is an enormous amount of work thrown upon the kidneys; if the temperature is raised, and the person has a good appetite so that he eats heartily, the result will be that this surplus food-material, not being consumed in the production of heat, must be carried off by the kidneys in the shape of <u>urea</u>, so there is an enormous amount of work imposed upon the kidneys. If this were not true, ~~when~~ the

temperature rose and we should eat surplus food in this way. We should have a fever, and we would have to be sent off to bed. So nature takes away the appetite in order to save us from doing ourselves harm. Now the effect of reduced appetite,, is to reduce the digestive vigor, and with lessened digestive vigor the blood is not enriched by the food elements taken into the body, and becomes somewhat impoverished in quality; the heart action also becomes lessened, and so we find the heart beating slower in warm climates than in cold, and it beats with less force and vigor,-- the heart is less vigorous, the respiration is less vigorous, the person does not take so much pure air, the blood is not so highly oxygenated, every organ is debilitated, and the brain is not so active as in a cooler temperature. So you see the natural effect of too high a temperature is debilitating.

And we may, in the winter-time, expose ourselves to too high a temperature, as well as in the summer. Nature brings us cold weather for the purpose of making us more healthy, elastic and vigorous. At each change of season, nature gives us a temperature by which we may may get a new constitution; in autumn we put on our winter constitution: in winter we are prepared for spring, and then our spring constitution is changed for one adapted to summer, and in summer we put on our fall constitution. When the horses shed their coats in the spring, and the dogs shed their hair, and the sheep begins to shed out his wool, the whole economy of the system changes; it is not simply the hair that is shed,, but the winter constitution is shed, and there is a

change that this external shedding is indicative of; there is a change which affects the entire constitution of the individual; it is a constitutional renovation. After a few months, the spring constitution gives way to the summer constitution, which is adapted to a high temperature,--a constitution which enables us to live comfortably in a warm season; but if we should continue to live in a state of exposure to warm weather, we should become greatly debilitated. After wearing our summer constitution for a few months, it is time for us to put it off and then, when fall comes, we put on our fall constitution.; then the bark begins to thicken and the plants put on their winter constitution, and it is precisely so with us; and with animals, the hair and the skin thickens, and other changes occur,--and it is so with us to some extent--although we do not have all the changes which animals have, because we can subject ourselves to artificial conditions (which animals cannot do) so we do not have all the advantages of the lower animals and plants in this respect. We are like hot-house plants which are taken in when cold weather comes: we are exotics, perhaps, not intended to live in a very cold climate. Nevertheless this change of season is favorable to us, because the winter season is more tonic--especially for invalids. I think there is no time of the year so good for chronic dyspeptics, and for persons who have torpid livers and weak nerves,--there is no season so favorable to health during the whole year, as winter: the general toning up of nature, the general reviving and enlivening of the

whole animal kingdom.

Thus we see that this season of the year is indicative of a constitutional change as the result of atmospheric changes; the air becomes purer, denser, and we breathe more oxyxen per lungfull than at any other season of the year, and, as the result, the vital fires are blown into activity, and the whole system is stimulated to active growth. Most people increase their flesh in the fall; they are getting ready for winter you see; this stimulation of the autumn frosts increases the appetites, invigorates the constitution, and we put on a nice blanket of adipose tissue just inside of the skin, to protect us against cold,--and it is so with the animals. Now we may take advantage of these facts, for the purpose of helping sick people get well. But if we shut ourselves up in the house and subject ourselves to an artificial atmosphere as warm, or warmer, than that to which we have been accustomed in the summer and fall, nature will not be stimulated to put on this winter constitution, and these reviving changes will not take place, -in other words, we will get no benefit from this change of weather. So the invalid who is able to go out doors ought steadily to accustom himself to cold air regularly, systematically,— every day he should go out and take a good breath of cold air; it will do you more good than a bath--or anything else that you can do. I believe a good deal in cold air baths. Some years ago I used to have patients taken out on the roof on cots, and breathe the cold air for half an hour every day; we called it the "air-pack"--we had to give it a name, in ordr to give it potency. So

i recommend this to patients, to go out and breathe the tonic, pure, cold air, every day.

We should not be afraid of cold weather; it is one of our best friends just now. The germs during the summer and the warm autumn days, have been producing general maladies, and these germs are now gone to sleep,--these hard frosts puts them all to sleep--or the majority of them: it sends them off to keep quiet during the winter. And now we have pure, fresh air, and a grand opportunity for getting well,—with the air dense, pure and fresh, and the atmosphere charged with electricity. You know, if you scrape your foot around on the carpet, you may make the sparks fly; I put out an electrical lamp in that way at one time,--I happened to approach very near an electrical light, and a long spark of electricity ran from my finger to the chandelier, and it immediately put out the lamp; the tension was so great that the addition of the spark of electricity from my finger snapped the carbon. This electricity is not the electricity of our bodies, but the electricity which we receive from the carpets by scraping our feet around upon them.

Now this condition of the atmosphere which causes an accumulation of static electricity in this way, is exceedingly favorable to vital activity, growth, and repair; and when we bear in mind the fact that getting well is a process of vital change, repair and growth of our bodies—just like the growth of a tree or a crop of grain--when we bear in mind that fact, we will remember that anything that favors tissue-growth, must be highly conducive to recovery.

What shall we do with reference to this matter of temperature ? When we find ourselves feeling a little chilly, instead of calling for a little more heat, look at the thermometer,--if you have one--and every one of you is entitled to a thermometer in your room; so if you want a thermometer, call for one and you shall have it . If you will use a thermometer, you shall have one. Get you a thermometer, and see that the temperature of your room never gets above 70°,--70° is high enough--if it were a little below that point, you could keep warm enough and you would be getting well faster than if the temperature were above 70°; it will be better for you, if you don't allow the temperature to go above 70°. In England, the temperature is never allowed to go above 60°. (We shouldn't have the transoms open in this room,--this is the fault of some of our employes; the air is supplied through these warm air registers, and the place for the regulation of the temperature of this room is ~~from~~ below). Keep the temperature of your room down to 70°,--and a little below, if you can; if you are too feeble, you may keep the temperature at 70°.

"But", you say, "what shall I do"? Put on more extra clothing; instead of attempting to get along with the thin stockings which you wore during the summer, wear good thick, woolen stockings. Instead of wearing thin cloth shoes, put on good thick felt shoes; those are the best, because they are porous, and allow the feet to throw off the moisture,--they are noiseless, flexible, and they are warm and comfortable; and you should get good felt shoes high enough to come up around the ankles . Wearing slip-

pers is unhealthy during the winter, -especially if they are thin tight leather slippers; and cloth shoes are unhealthy also, if they are very thin. Woolen cloth or felt shoes I think are much preferable to any others. You should also wear good thick under-clothing. I think it a general fault of people, that they try to go through the winter with too thin under-clothing; ladies generally do this more than men, because the thick underclothing might give their forms a bungling appearance. I have been astonished to see a lady going out in a cold winter's day wearing a thin dress, a garment that a man would not consider thick enough for a summer over-coat--or summer coat, even--and no covering for the arms, except a thin Lisle-thread garment, or something of that sort, which is really a hazardous thing to do. Women should be as warmly clothed as men, but they don't wear as much clothing--especially around the trunk of the body; this part of the body contains a very important organ, and persons--especially those who have weak stomachs--need to have warm covering over that part of the body. I have known people to be cured of stomach troubles by simply wearing a good flannel bandage over the stomach. The back of the neck is also a sensitive part; the nerves of that part of the body are closely connected with the nose, throat, and air-passages of the lungs, and when this portion of the body (the back part) is exposed to cold, it is very likely to produce a reaction, and cause sore throat, catarrhal and other troubles. I have known people to get rid of catarrh and bronchial trouble, by

wearing a good warm covering between the shoulders and back. When a person first takes cold, one of the first sensations is chilliness up and down the spine; you don't feel these sensations running up and down the arms and chest, but up and down the spine, which I suppose is due to the important relation of the nerves of this part, to the respiratory passages which are so frequently affected when one takes cold .

A Lady : Do you advocate the wearing of chamois .

A. Well, there is no harm in that,--it is good for us, xxxx xxx but I think flannel, is, on the whole, better.

Then you should not be content with keeping your temperature down, in-doors, but go out -doors every day (or if you can't go out doors you may go out on the porch every day,--the porch is covered). Go out every day, from the very beginning of cold weather and continue this as long as the cold weather lasts, and it will do you good. Instead of dreading the cold weather (as the invalid frequently does; and confines himself in-doors), you should go out into the wholesome air,--you will enjoy it, and it will greatly benefit you.

I always hail the coming of cold weather with delight. I feel anxious to have the first frost, because I know it wipes out a whole lot of complications: invalids cease to be troubled with bowel complaints, attacks of indigestion, and a great many other annoyances which decrease very greatly as soon as cold weather comes. The fevers which come in the fall, are cut short by the

first hard frost. You remember, at the South, the newspaper advertisers and the real-estate dealers claim so much for their frostless climate: some years ago, I was quite interested in observing the reports concerning Tampa, Fla., at the time the yellow fever broke out there. When I visited that place a number of years ago, they told me that frosts were unknown there, and they were so proud of that fact--that they were below the frost-line; the real-estate dealers said in their advertisements that they were below the frost-line, so there was no danger of the frost doing any damage to the oranges, and you would be perfectly safe from"Jack Frost", in their part of the country. But, when the yellow fever broke out, the people even prayed in church for frost. By and by the frost appeared, and that fact appeared in the papers,--that "Jack Frost had called upon Tampa", and that the yellow fever would soon disappear--that the patients were all better, and they all rejoiced because they had had a visit from Jack Frost. Now Jack Frost does the same sort of good for us, only we don't notice it. Frost killed the yellow fever germs at the South, and it is killing multitudes of germs at the North which we do not recognize. So, in the winter time, let us go out doors and bathe in this wholesome germless air--this pure, oxygenated air--and get the benefit of it, instead of remaining in-doors.

It is the difference in temperature which makes the difference in the amount of oxygen. If we shut ourselves up in rooms heated to 80 in the winter time, we are breathing summer air all

winter, whereas, if we go out doors and breathe air at 40° or 30°, we have a wonderfully improved atmosphere. Just think what a difference there is in temperature between 10° and 30°--70° difference : Now the air increases in volume 1/140th for every degree of temperature; so, for 70° we will have 70 X 1/140th which is 1/7th. So you see we get 1/7th more oxygen when we breathe air at the freezing-point, than when we breathe air that has been raised to a temperature of 100°,--and so of all other differences in temperature.

Now, in reference to the moisture of the air : This is a matter of importance in the spring time, when the air is frequently saturated with moisture. In the spring or in the summer time during a rain, or just before a rain, or just after a rain, the air is practically saturated with moisture; and the air becomes saturated with moisture every night during the night, and so have dew on the ground; the fact that we have dew, is evidence that the air is saturated with moisture. In countries, and in some parts of this country, (such as Arizona, Colorado, and some parts of California), dew is never found on the ground. The fact that we do not generally find dew on the ground, is evidence of the dryness of the climate; but the presence of dew on the ground in the morning, is evidence that the air has been saturated with moisture, and as the temperature has cooled during the night, the excess of moisture has dropped out. It is necessary that the air should contain some moisture. If the air is too dry, it loses its ability to take up organic matter from the lungs, the mucous membrane of

the lungs becomes dry, and the oxygen does not pass in so readily and the carbon-dioxide does not pass out so readily. In a very, very dry atmosphere, the efficiency of the lungs as a means of eliminating poisons from the body, is greatly diminished.

It has been found by experiment, that the amount of moisture required, is about two thirds of the saturation of the air,--that is, about two thirds as much moisture as it is possible for the air to hold. Now I am going to show you how much moisture we breathe and how much is necessary to add to the air that we breathe, in order to bring it to the right point. We will take it in the winter, when the air is at zero: it now contains but one drop (about one grain) per cubic foot of air at zero; we breathe air in-doors which has been raised to a temperature of 70° (it is a little higher than that, but we will call it that, for convenience of figuring). Now we will increase the temperature of this air which is at zero, to 25°, and we have two drops; to 50°, and we have 4 drops; to 75°, and we have 8 drops, doubling the amount of moisture at every addition of 25°. And so if we lower the temperature, the moisture will evaporate, until we come down to zero, and then we will have only this one original drop of moisture. People talk about burning out moisture by a furnace, but that is impossible; the air is never burned out by the furnace, but furnace air seems to be burned out, because it ~~seems~~ is very dry. The reason why it is dry, is, because the temperature has been raised up to about 70°, and there has been no moisture added to it;

it is capable of holding 7 more drops of water than it has, so it is very thirsty, and it will take up moisture wherever it can find it,--it will take up moisture from the eyes, from the nose, and from the throat,--the eyes and the nose will feel dry and the throat will feel parched,--the air we have this morning is a little too dry, so this air is very disagreeable. It is not necessary, however, that the air should be completely saturated, because if it is, it will not take up the moisture of the body with sufficient rapidity. Two thirds of the saturation of the air, is about 5 1/2 grains per cubic foot, so we need to add 5 1/2 grains to make the saturation complete,--we need to add 4 1/2 grains to make the saturation sufficiently complete to render the air bland and unirritating to the lungs, and to facilitate the eliminative processes of the lungs. How much water then, must we add to the atmosphere of an ordinary house ? You will be surprised at the quantity of water needed to moisten the air properly. First, how much air do we need ? According to experiments which have been made,(and repeated many times) it is necessary that we should have, for every human being, for every hour, 3000 cubic feet of air (2000 cubic feet is the smallest amount allowable, but 3000 cubic feet per hour, is the amount which we ought to have, in order that the air should be pure). Now if, for every cubic foot of air, we must have 4 1/2 grains of moisture, we will multiply 3000 by 4 1/2, and we shall have the amount of moisture necessary :

3000 X 4 1/2 = 13500,--and 13500 grains lacks only 5 grains of

two pounds,--but, for convenience, we will call it two pounds,--and you know the old saying, "A pint's a pound, the world around",--so this calculation means that it requires a quart of water added to the atmosphere saturation; so you may put that down as a rule, that that quantity of water for every 3000 cubic feet of air, must be evaporated in a house having an ordinary temperature, in order to moisten the air properly--a quart of water every hour for every 3000 cubic feet of air, or 24 quarts in 24 hours. I don't think it is absolutely necessary that we should have this amount of moisture,--that would supply the best conditions perhaps, but we may breathe air somewhat dryer than this; we may take from this amount of saturation, 1 1/2 grains per cubic foot of air, which will leave 3 grains to be added (instead of 4 1/2); we can do this, without noticing any great inconvenience,--and it may be, that this dryer air is a good vital stimulus under some circumstances. So we will say that we must have 3 grains of moisture for every 3000 cubic feet of air, to be added to the moisture of the atmosphere of the ordinary house: 3000 X 3 = 9000 grains, or 1 2/7th pounds; and if we call this just a pound and a third, we will certainly have liberal supply of moisture,--that would be one fourth less than we figured at first. A pound and a third per hour is equal to 1 1/3 pints in one hour or 16 quarts in 24 hours--4 gallons of water every 24 hours! You see, then, the importance of having some means of moistening the air. Every furnace should have its water reservoir, and this should be con-

stantly filled with water.

If a building is heated by steam, it is necessary that some of the steam should enter the air. Some people say they don't like steam-heating, because it is so dry ; it is no dryer than any other kind of heat; it is because there is no moisture ~~is~~ added. It is necessary that water in the shape of evaporation shall be thrown out into the air. Steam-heating is a very convenient method because it is water already evaporated; we have steam-jets to throw steam into the air, but we have not set them into operation, because the air has been moist enough,--but this morning, it is a little too dry, and we will set our steam-jets in operation today, and then the air will be supplied with moisture sufficient to keep the atmosphere at the proper point.

We have, in our heating-rooms, the means of determining the amount of moisture present in the air,--and it is such a simple means of determining this, that you can use it in your own houses, if you please. It consists of two thermometers--a wet bulb and a dry bulb: Take a common thermometer, and take a circular candle-wick (such as used to be used for lamps), and pull it up over the bulb of one of the thermometers, and let the end hang down over a cup of water,--the water will be carried up by the wick. (Diagram). Suppose this represents the thermometer : put the candle wicking around it and let it run down into the cup of water, and it will be continually ~~be~~ carried up and keep it moist, so that there will be water around the bulb continually,--the

evaporation of water will cool the bulb; the rate at which the water will evaporate, will depend upon the dryness of the air; if the air is completely saturated, there will be no cooling and no evaporation, and the mercury in the tube will stand at the same point; but when the air is very dry, there will be a great amount of evaporation, the bulb will be cooled, and the mercury will stand about 10 degrees lower than before. If the difference is 16 or 18 degrees, the air is too dry; the difference ought not to be more than 6, 8, or 10 degrees,--that is about the right difference of saturation. So you should have two thermometers in your room,--one with the bulb covered with candle wicking and kept moist by a little reservoir beneath, and if they are dry, you can regulate the air nicely. If you find the difference between the dry bulb and the moist bulb to be 16 or 18 degrees, you must introduce some other means of evaporation; perhaps you may have to have a gas lamp or a kerosene oil-stove, or a gasoline stove burning, on purpose to evaporate the moisture,--or, if your house is heated by steam, you can have steam-jets to regulate the moisture. It is this excessive dryness of the air that causes the pianos to get out of tune, and the windows to rattle, and large cracks around the doors, and cracks to open in the floor,--the abstraction of moisture causes this.. How this same dryness is more or less harmful to our bodies, through excessive extraction of moisture from our bodies.

This is a practical question, although it is not generally understood--and in the construction of our houses, we should make

provision for supplying means for the regulation of moisture, as well as of heat. Next time, we will talk about electricity and the influence of atmospheric pressure.