

Dr. Kellogg's Residue

Lectures to
Medical Students

Mar. 18/98 (No. 3)

LECTURES TO MEDICAL STUDENTS. (No.3.)

Dietetics--Fruits.

J.K.Kellogg, M.D.

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AS I was coming down here this morning, a line of experiment occurred to me which I thought would be profitable for some one to take up, in reference to the acidity of fruits,--to take up the different varieties of fruits and determine their acidity--for instance, the different kinds of apples and grapes, California grapes, Michigan grapes, etc. We have but little information upon this subject, as fruits have been considered by writers upon dietetics as of comparatively small importance; they have not looked upon them as valuable, in the light in which we look upon them, consequently writers differ as to the acidity of fruits,--for instance, sour apples,--one writer puts the acidity at 8.4 and another at 3.5 per cent., etc; ^{so we don't know what acid is given.} The percentage given here is probably the percentage of malic acid. It would be well to have our fruits arranged in a table and their acidity determined upon a common standard; the different acids have a different relation to the digestive process. It is the acidity of the fruit which has an influence upon salivary digestion; so I think it would be well for some of you to volunteer to take up this line of investigation. Then I think it would be a good thing to have a knowledge of the acidity of the different fruit-juices, so we would know how much acid we were giving our patients and what influence that acid would have upon salivary digestion,--but we will consider this a little further on. Now for convenience, suppose we write upon the blackboard some of the different fruits in relation

to their acids. So far as our knowledge now goes, we see that the pear is the least acid of all the fruits,--that its acidity is about .2 per cent.--

Q. Does not the acidity differ or vary with the condition of the fruit?

A. Yes; but that is another point which we will consider later. We will then consider the different kinds of fruit and their acidity while green, while mature, and while very ripe; and we will also consider what effect the sugar of a fruit has upon the acidity of the fruit. Now we will put down the pear as being the least acid of all the fruits,--that is, the sweet pear. We may find that a ~~sweet~~ apple is no more acid than a sweet apple, and that a sour ~~apple~~ has no more acid than a sour ~~apple~~ pear; but this is put down as an average by the authors on dietetics. The acidity of the sweet grape (the ordinary sweet grape) is about .63%, and an ordinary sweet apple at .84; but the acidity of sour apples is put down as high as 3.5%. The acidity of all the rest of the fruits is put down at practically one per cent--a little less than one per cent.--with the exception of the currant, which is two per cent., and the orange, which is 2.4, and the lemon, which is still more acid; but we have very sweet oranges and very sour oranges, and we have lemons almost as sweet as honey,--the sweet lemon is almost as sweet as honey. So we have such a variety of acidity that we need more information; we ought to have a table giving information in reference to forty or fifty--perhaps a hundred varieties, ^{after} determining, for instance, the acidity of four or five varieties of peaches, five or six varieties of plums, etc, then determining the acidity of the fruit--

juices. We can obtain the acidity of fruits in all their different conditions also; ~~and~~ This would be an interesting study during the next six months, so that next year we would have some definite information upon this subject. It would be interesting to have an experiment made at once,--for instance, with apple-juice or grape juice, as they are presented at the table; of orange-juice as you find it in the can, or of canned peaches; just take some of the fruit or the juice and ascertain the degree of acidity, without analyzing the malic acid, Tartaric acid or the citric acid; just determine the acidity of the fruits and fruit-juices.

Now, in reference to sugars,--we will write the fruits here in groups,-- peaches, apricots, plums, one-half to two percent. Raspberries and blackberries, four per cent.--it is only approximately--one is four and the other just a little less than four per cent. Now put down strawberries, whortleberries,, ~~strawberries~~, currants, prunes, six percent. Apples, eight. (This is sugar.) Apples, eight per cent.. Sour cherries, nine per cent.; that does not seem to be very sour, but it has acid enough to make it very sour. Sweet cherries, eleven per cent. Grapes fifteen per cent.; these go together--they are very nearly alike, and we would naturally put these together--with the exception of currants. It would an excellent thing to take up the study of the sugar of fruits in their different varieties and conditions. This sort of information is of great practical value. Here is an opportunity to bring your chemical knowledge to bear in a way which will be of great practical value to you. I don't know of any line of study which would be of more value than that of fruits. We need to know just what to say to patients when they say, "I can't eat fruit." You can say, "You can eat them if they are the right kind,--" but you want ^{and condition}

to know what the kinds and conditions of fruit are.

Now, in reference to the skins and seeds of fruits: They are indigestible. The skins of fruits are water-proof and germ-proof-- they are not exactly water-proof, but under ordinary circumstances, the skins of fruits as they hang on the tree shed water. And nature makes an additional protection to that, by covering the skins of fruits with a sort of glue, --to the skin of the peach, for instance-- so that the water does not stick to it; so of grapes, apples, etc. Dip fruits in water and it runs right off. Some apples have an oily feeling to the skin--it is rather waxy than oily. This is nature's method of waterproofing fruit so it won't lose its aromatic flavors and soluble juices; otherwise these would be rinsed out of the fruit if it was left out in the rain. The lusciousness of fruit depends upon the amount of soluble material it has in it. Fruit is very disagreeable when green, but when it commences to ripen it is fully ripe in a few days and then it is delicious and mealy by the simple conversion of the starch and other substances into aromatic, savory and palatable flavoring materials.

Now let us consider the uses of fruits: The most abundant element of fruit is water; some doctors consider fruits as being nothing but water, and people generally look upon them in the same light,--simply as luxuries to be eaten at the end of a meal simply as a dessert and not as ~~food~~ necessary food. It is usually eaten at the beginning or the end of a meal as an appetizer, but as a very unsubstantial food. Most fruits (unless they are dried) contain a large quantity of water, but

the water which fruit contains is the very choicest kind of water; it is water which it is always safe to drink. I was glad to remember that when I was in a yellow fever region. Some years ~~then~~ ago when in Mexico I was obliged to spend a whole day without water, because my water supply had given out,--not knowing how thirsty my party (there were some half dozen of us) I had not provided a sufficient supply of water, and it gave out and we were obliged to fall back upon oranges, knowing that they were germ-proof,--that yellow fever germs could not get through their skins. We can take all the oranges and fruits we please, if we are only careful that the skins do not contaminate the interior. My belief is, that yellow fever is communicated by water and food; in malaria and yellow fever regions it is generally communicated through water and food, and in such a region, if one cannot provide his water, he may depend upon fruits for his supply of water and thus be protected from any possible contamination by malaria germs. Br. Kerr had malarial fever in Africa and was very much astonished that he had it, but in a letter home, he said that he became very thirsty, because he had not provided a water-supply, and in his thirst he took a drink out of a stagnant pool by the wayside, and his trouble began right there. I think it is in the Medical Missionary that he raises a very earnest admonition to all missionaries going into such countries to boil their water. I think the last thing I said to him was, "Don't forget to boil your water!" I also wrote him in a letter not to forget to boil the water he used and not let the outside of his fruit contaminate the inside, and that if he would do that, he would be protected against yellow fever. But in his own experience from which he nearly died, he tells me that if he had not neglected these things he would not have suffered so much

much. We have lost some missionaries in Jamaica by yellow fever, and I think it was because they neglected this precaution. This is a life-saving truth; it is very simple but it is capable of saving life, and we should propagate this truth--

Dr. Paulson: We speak of such cases who have died from yellow fever through neglect of these precautions, as having devoted their lives to the cause, and as being heroes.

Dr. Kellogg: Yes. The Lord lets people die, if they don't observe the laws of life and health; he has created these principles and given them to us; we have a knowledge of them, and if we won't obey them we must take the consequences. It seems to me that those persons who have been enlightened upon these points suffer more than those who have not been enlightened; I don't think they can ask God to heal them with the same faith as others who have not these principles to guide them.

But some may ask, "Do not watermelons produce malaria?" I am inclined to think they do under some circumstances,--I would like to know your experience upon this subject.

Br. Ellwanger: We raised quite a number of watermelons down in Maryland, and it seems to me that after eating watermelons,--over-ripe watermelons-- malaria came on.

Br. Allen: In Arkansas we have malaria in the watermelon season. The doctors attributed this to eating watermelons--especially green melons.

Miss Conway: I understand that some persons have had malaria after eating melons that have been cracked. Would that be a cause of malaria?

Dr. Kellogg: The watermelon grows on the ground and is very much exposed to the attacks of germs, and it is likely that the outside of the watermelon is covered with ~~parasites~~ malaria-parasites. From the circumstances under which the watermelon is grown, they must be productive of germs. When one eats a watermelon when the shell is almost as hard as a bone, and they gnaw it as a dog gnaws a bone, the face and mouth are exposed to contamination with malaria-germs which are on the rind of the melon. There are malaria-germs on the outside of watermelons, and if you cut into one with a knife you infect the interior of the melon. I believe there is something in this notion of getting malaria from eating watermelons. Very ripe watermelons, when cracked may become infected with these germs; and a very ripe melon gets loose at the stem and the parasites get in there and contaminate it. So it is quite possible to get malaria from eating watermelons. But the interior of the watermelon--the juice-- the normal watermelon in normal conditions is absolutely free from germs of every description.

Dr. Heald: Is there evidence that people may get malaria from melons that have been shipped ^{to} from a non-malarial district.

Dr. Kellogg: I do not know of such cases. It might be possible that the germs or parasites might not survive in shipping a long distance. You know the parasite is a very short-lived being,-- its life being not to exceed 48 to 72 hours, and so these germs might become extinct in the shipping of the fruit. This might explain the fact that a person does not get malaria from eating watermelons when shipped a long distance.

(A student.) I have heard it said that in new countries, especially where prairie has been broken, that malaria is more common than before,--I refer to climate.

Dr. Kellogg: The condition is favorable to the propagation of germs or parasites which are supposed to be present.

Br. Dunlap: Is it not considered that the eating of the watermelon at improper times and with a lowered vitality renders one susceptible to malaria?

A. Yes. And people often eat watermelons instead of drinking them. The watermelon consists of water, sugar and wood. The pulp of the watermelon consists chiefly of wood, and by eating too much of this the stomach is overloaded and there is hypopepsia. The parasite might also be received into the mouth through the air or the food, and there might not be sufficient hydrochloric acid to kill the germs and so they cause a disordered condition of the stomach. An English physician who had practiced for years on the Gold Coast says he observed that people with healthy digestion never had malaria; that malaria always followed indigestion. Br. Kerr observed this to be particularly true in the case of one of his colleagues; he said he would overeat with all sorts of stuff,--that he would stuff himself with all sorts of things and in a few days he would have an attack of malaria; that after gormandizing, in a few days he would have an attack of malaria. These are very practical matters to understand in reference to health,--but we have some other things to learn in reference to fruits.

Fruits are also valuable as nutrients. It is possible to live on fruits; but if a person is going to live on fruits he must take the right kind of fruits. But fruits are not always capable of sustaining life,--at any rate to any great extent. The fruits which are best for

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this purpose are figs and raisins--(you had better put some of these things down for convenience in giving lectures). Considered as nutrients, the fig, the date the apple, ~~the prune and the grape are perhaps the~~ most nourishing of the fruits,--the cherry might perhaps be added because it contains such a large amount of sugar,--but we place the fig at the head of the list, and then the date, the raisin, the prune, the grape and the apple.--

Q. How about the banana?

A. And the banana. We put these fruits together--perhaps we should put them in this order--the fig, the date, the banana, the raisin, the prune, the apple and the grape.

Q. Is the date very nourishing in its natural state where it is preserved in sugar?

A. It is better in its natural state. I don't know why, but among the arabs they don't preserve their dates in sugar. One of these days I hope we shall get dates in their natural condition,--just as the Arab takes them; they are very much better in that way.

We will take the fig: --the fig contains how much of fat? ("1.4.") Yes,--and how much sugar? The fig contains 50 per cent. of sugar. The date is about the same as the fig,--I mean the dried fig. Now the fig is used for food,--in Smyrna, for instance, and the porters there who eat figs for food carry ~~off~~ ^{half} a ton of baggage on their shoulders. They live entirely upon dried figs and ~~barley loaves~~ --small loaves of barley bread, or barley gruel. These foods are almost all these people have to live upon,--and yet they are the longest lived and the strongest peo-

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on the Suez Canal would far outdo the English laborers; that they lived upon dates, rice and barley, the simplest foods. We can live a long time simply upon grapes or raisins,--but we will talk about this later.. However, in the use of grapes we must consider the indigestibility of the skins and seeds,--but we will speak of this later on. I should also mention the fact that the gipsy natives of South America live entirely upon some variety of the banana or plantain,--the banana is a variety of plantain. In that country the natives are so accustomed to the use of bananas and live upon bananas so almost exclusively that they would starve to death if a year's harvest of bananas should fail. Some of these men go out into the mountains to gather rubber which is very laborious work; they go to gather it where it grows,-- in wilds and thickets mountain gorges, morasses, etc.. They have a sort of leather pouch which they carry on their back, and when they find a little rubber they stick it on their backs, and in this manner they keep sticking it on until they have a load of rubber gum. A man will start out to get a load of rubber gum in this manner, and with nothing but a handful of bananas for his whole sustenance during the day, and he will get a load of as many as a couple of hundred pounds of rubber gum and carry it home; and these men live entirely upon bananas.. I was very much surprised when in Mexico and also in Havana to find that the plantains were almost always boiled in oil, which must render them almost indigestible, and the larger amount of starch that the food contains the more indigestible it becomes,--that is, when it is impregnated with free fat--for starch, as you know, becomes indigestible by mixture with ~~free~~ fat. But

on the Suez Canal would far outdo the English laborers; that they lived upon dates, rice and barley, the simplest foods. We can live a long time simply upon grapes or raisins,--but we will talk about this later.. However, in the use of grapes we must consider the indigestibility of the skins and seeds,--but we will speak of this later on. I should also mention the fact that the gipsy natives of South America live entirely upon some variety of the banana or plantain,--the banana is a variety of plantain. In that country the natives are so accustomed to the use of bananas and live upon bananas so almost exclusively that they would starve to death if a year's harvest of bananas should fail. Some of these men go out into the mountains to gather rubber which is very laborious work; they go to gather it where it grows,-- in wilds and thickets mountain gorges, morasses, etc.. They have a sort of leather pouch which they carry on their back, and when they find a little rubber they stick it on their backs, and in this manner they keep sticking it on, until they have a load of rubber gum. A man will start out to get a load of rubber gum in this manner, and with nothing but a handful of bananas for his whole sustenance during the day, and he will get a load of as many as a couple of hundred pounds of rubber gum and carry it home; and these men live entirely upon bananas.. I was very much surprised when in Mexico and also in Havana to find that the plantains were almost always boiled in oil, which must render them almost indigestible, and the larger amount of starch that the food contains the more indigestible it becomes,--that is, when it is impregnated with free fat--for starch, as you know, becomes indigestible by mixture with ~~free~~ fat. But

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it is almost the universal custom there to boil the plantains in hot grease. Sometimes they are cut into slices and boiled --dropped into a kettle of boiling fat which seems to be absolutely indigestible. But they feel the need of fat, and the banana is lacking in fat, and so they choose to prepare it in this indigestible way. If, instead of doing this, they would add nuts to their bananas they would have a proper dietary. But it is possible to live upon the banana with the addition of a little fat. In Africa the people add fat to the banana but they don't have fat enough to boil it in, so they use "ghee" which is a sort of powder and must be cooked, boiled or melted and the albuminous portions skimmed out, and then it makes a good fat and keeps. I might mention an interesting fact which I learned some time ago, --that in Africa Mr. Stanley and his company lived almost entirely upon banana flour. If you will read Dr. Jamison's account of Stanley's travels you will find that the natives were obliged to depend upon ~~the~~ banana flour almost exclusively. Stanley fed his patients upon banana flour and they usually recovered. Another traveller with him says that he attributed the good health of his people to the abundant use of banana flour. When they got out of food in their travels they would stop and dry bananas in the sun and make banana flour for some days, and then proceed. Banana flour you can readily see must be a nutritive food as it contains a large amount of nutriment. I would be glad to have you make experiments upon banana flour; we have abundance of it. You will find it ^{very} toothsome and slightly acid, aromatic food. The color of this food is a darkish gray, but it is delicious with the addition of a little lemon juice or acid of some kind .. I have been trying to make arrangements with people in tropical regions to send us samples. I hope next year to get ~~abundant~~ banana flour introduced more generally. I believe it is an extremely valuable food.. The reason for this we will

talk about later; we simply want to know now that the banana is a food which can be depended upon to sustain life. Now will some one undertake to make a few experiments upon the banana? (A hand up.) We will make experiments upon the salivary digestibility of banana flour,--first make it in a solution of water--into a soft mass; and test it for the purpose of finding out how much sugar there is, and see how much sugar you will get by the action of the saliva; I think you should use 10 c.c. of saliva with perhaps one c.c. of banana flour, and vary the experiment in different ways,--there are several methods--and see how much sugar is produced; see how much sugar you can get from banana flour. It would also be well to make a control-experiment, noticing the effect of saliva in the digestion of corn-starch. You might verify some other interesting facts that have been recently brought up. Make a control-experiment with potato-starch, corn-starch and banana flour; give them all the same conditions of saliva, and notice the amount of starch digested as the result of the action of the saliva. Use your own methods of investigation.

Next time we will take up the relation of fruits to urinary secretion, and the relation of fruits to the bowels and to digestion and a number of other practical points which I think it will be worth while to consider.

Mrs Whipple

W. K. Kellogg.

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LECTURES TO MEDICAL STUDENTS.

Dietetics--Fruits .

March 17, 1898.

Relation of Fruits to Digestion.

J. M. Kellogg, M.D.

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QUES.--Will sugar neutralize acid? Is it true that sugar on fruit with milk will cause the milk to curdle less quickly than without the sugar?

ANS.--I don't know of any evidence of that. Possibly the sugar might protect the berries to such an extent that the cream would not come in contact with the acid. Now we will try and conclude the subject of fruits,--though I fear we shall not exhaust the subject, for it grows all the time. I am all the time finding something new about fruit...I think there is a mistake in stating the amount of albumin here; my recollection is that its nutrient value is 24 per cent. instead of 14 per cent.

Now let us consider the most important part of the subject,--the practical side of it--the relation of fruits to digestion. Fruit is unquestionably one of the most important of foods in consequence of its peculiar relation to the digestive process. Fruits occupy the most prominent place in the diet of human beings. It is very strange indeed that they have been relegated to the background so completely that they are, as a rule, used only as a luxury. The same is true of nuts. I sent around a circular letter to all our consuls in reference to nuts,--their growth and to what they are used, etc., and they give

scarcely a single instance in which nuts are used as an important element of diet; it is only in a very few cases and among primitive people that nuts are used as a staple article of diet. I find that fruits are used by only a few people as a staple article of diet. But among civilized people we find fruits but very little used except as luxuries. This is particularly true in the southern part of the United States where fruits grow most luxuriantly. Where the finest fruits can be raised and in the greatest variety they are almost entirely tabooed and the inhabitants depend for their sustenance upon lard and corn, or "hog and hominy" as it is termed in the South. There are millions and millions of people who scarcely ever taste of fruit at any time of the year; they rarely ever have fresh fruit.

First let us consider the natural properties of fruits from a digestive standpoint: The aromatic substances, the soluble substances and the acids are all peptogens of the most important character. A peptogen is a substance which, while it is not a food-element, has the property of stimulating the flow of the digestive fluid. The fruit-acids, the sugars, and others, and dextrines all have--at least the first three have--^{the effect} of stimulating the flow of saliva; so that in the use of fruit we have a stimulus to the flow of the secretion of the salivary glands? When swallowed into the stomach, the dextrine, the sugars, the acids and the ethers become powerfully active ^{as to} as peptones for stimulating the outflow of fluids for the digestion of the albuminous elements of food. However, in this respect fruits are active only in proportion to the quantity of these substances which they contain; and the acids of fruits are not so powerful in stimulating the outflow of gastric juice as dextrine and some of the other food-substances in sugar.

We see, then, that in beginning a meal with fruit, we have a natural method of exciting the activity of the stomach and of the whole secreting apparatus of the digestive organs,--we have here an important means of starting the digestive apparatus into action. This is a natural thing--taking food at the beginning of the meal, by which to start the action of the digestive apparatus. We find another reason for that: We find that fruit also stimulates naturally the reflexes which cause the movement of the alimentary canal, setting up those motions in the stomach and bowels by which the digested portion of food is moved into the small intestines. The effect of the food taken at the morning meal is to move the food taken at the previous meal, and by a repetition of these movements it is moved into the small intestines where it remains about fourteen hours,--that is, it is ^{there} about fourteen hours before it is crowded into the large intestine; that is a longer time than is usually supposed.. By the influence of the food which we take at *the morning* meal, the food taken at the previous meal is moved along on its way to the small intestines, and the meal taken previous to the ~~first~~ *second* previous meal is moved along on its way to the large intestine where it remains for at least ten or twelve hours, more, to be deprived of its nutritive portions by absorption. So it is very important that food should be taken into the stomach of such a character as will set up this peristaltic movement by which the previous meal is carried into the small intestines for solution, after which it is moved on into the large intestine for absorption. This is the natural rhythm of the digestive process. That is the reason the evacuation of the bowels occurs in the morning after breakfast,--and frequently it occurs twice a day,--after breakfast and after dinner--sometimes half an hour

after breakfast and after dinner,--and perhaps in less than half an hour. After the morning meal there is a desire to evacuate the bowels, because the taking of the meal causes the peristaltic movement, causing a succession of these movements, so a change takes place in the portions of food; so we have three portions of food in the alimentary canal--part of the time, at any rate--that which has just been taken; second, the food which was taken at the previous meal, and third, the food taken at the second previous meal. So the food taken at the second previous meal is ready for absorption, and that portion of the food in the colon which has been deprived of its nutritive element, is ready to be discharged from the body..

So this peristaltic movement--this stimulating effect upon peristalsis which fruit possesses is of great value in this way,--for the setting up of the rhythmical movement by which food-substances are moved along the alimentary canal.

The acids are of particular value ~~in this~~ in this respect, and this is why the orange and the apple are especially good when taken before a meal, and why acid fruits are more beneficial than other kinds of fruit. The acid stimulates the movement of secretion of the salivary glands, stimulating the activity of the salivary glands to a considerable extent. The gastric juice is not so stimulated, so much by the acids of fruit as it is by the sugars and the dextrines,--and we see the reason for this; that in the natural process of digestion, as the dextrine is secreted in the stomach its movements are promoted thereby and become more and more vigorous. As the acidity of the stomach rises in degree, by and by, through these movements the fluid portion of the food is squeezed into the small intestines, and by and by even the solid contents will also be crowded

on into the small intestine. In this manner fruits or fruit-juices operate. So we can readily understand that when we wish to have a motor effect in the alimentary canal, if we use acid fruits or fruit-juices we get a decided effect,--if we want to get a decided effect upon the digestive process we should use acid fruit before a meal. So an orange or a glass of sour lemonade is extremely effective in answering this purpose. I don't recommend the use of sugar for the reason that sugar is itself unwholesome when taken alone in the stomach.

Another point of great importance in relation to the digestive properties of fruit, is the antiseptic properties or germicidal properties of fruit-juices--

Q. Do you say that sugars promote the secretion of gastric juice?

A. Yes; sugar and dextrine are peptogens, because they promote the secretion of the gastric juice. One digestive process prepares the way for the next,--it is like setting up a row of bricks in such a way that if you tip over the first brick or strikes the next and tips it over and that brick strikes the next, and so on until all the bricks are knocked over, the first process preparing the way for the next.

So in the digestive process,--the starch promotes the flow of saliva; the saliva converts the starch into dextrine and sugar which stir up the stomach to pour out gastric juice to digest the albumin, etc. So these two juices act, first one and then the other, upon the food and aids in its digestion,--for instance here is a potato that has been cooked (illustrating by diagram), and the cells are broken in this way. Here are the starch granules which the cells contain; you have these large cells and the starch-granules inside; that is what you see in the po-

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tato. There is also a fine network of albumen running through these spaces (illustrating by diagram); these spaces are filled up with threads of albumen, so that the starch lies in this mesh-work of albumen. When the potato is cooked this starch is coagulated,--it is imbedded in the mass of albumen,--we might represent it in this way (diagram) in cooked foods, in bread and in cooked farinaceous foods of all sorts. The albumen is a solid mass like the white of an egg; let these white masses represent the starch granules, and let this represent the albumen.--

DR. PAULSON: It looks very much like connective tissue.

DR. KELLOGG: Yes. The protoplasmic elements run in threads all through the albumen and this coagulates and constitutes the albuminous portion of food. This requires two things to break it down,--you must have both the saliva acting upon the starch and the gastric juice acting upon the albumen in order to break down the entire mass. When you take vegetable food the starch is digested by the saliva and the albumen by the gastric juice, and then the food is broken to pieces,--there is nothing to hold it together. The fat and the sugar are the only elements that digest below the stomach,--that is, exclusively below the stomach. So the effect of ~~these~~ the action of these two elements, saliva and gastric juice is to entirely disintegrate the food in the stomach, so that after the food has left the stomach it is nothing but a soft, pul-
taceous mass; there is only the soluble sugar (if sugar has been eaten), and the fat is melted by the warmth of the stomach and will mix with the other elements of food and take the form of an emulsion. The saliva first acts upon the starch which constitutes the great bulk of the food. Next, the gastric juice acts upon the albumen, and then the food is reduced to a fluid or pultaceous state and ready to be moved along in the

intestines . Then the action of the gastric juice upon the food when it enters the small intestines stimulates the upper portion of the intestines; ^{the food} comes in contact with the bile-ducts and excites them to action and they pour out a shower of bile into the intestines, neutralizing the acidity of the gastric juice; and the same thing occurs in relation to the ~~gastric juice~~ pancreatic juice after the stomach is "dumped," so to speak; there is a sort of dumping process for about fifteen minutes; the bile comes down at the same time the contents of the stomach are emptied into the small intestines; the bile neutralizes the acidity of the gastric juice of the stomach and prepares the way for alkaline digestion in the intestines. So we see how one step in the digestive process prepares the way for another. Frequently we have no starch, but we have the natural peptogens already prepared in fruits.

The process of ripening fruits is entirely akin to the process of digestion; ripening is really a process of digestion in which the starch is converted into dextrine, sugar and other soluble elements. Ripening is just as much a process of digestion in fruits as is the change which takes place in the roots of the maple tree at this time of the year, as soon as the warm sunshine penetrates to the roots of the maple tree the starch begins to be converted into sugar in the form of sap which ascends into the tree. There is also a form of digestion which takes place at the tip ends of the maple tree, so there is a digestive process which takes place at both ends of the tree,--and in our own bodies we have the same thing taking place . This is an illustration of the universality of the laws of life throughout the whole organic world in both the animal and vegetable kingdoms.

DR. PAULSON: I did not get the idea in reference to the process of digestion in the leaves of the trees, or the twigs.

DR. KELLOGG: A digestive process takes place in fruit trees in the spring converting the starch of the tree into sugar. Then we have the same process taking place in the ripening of the green fruit at the tips of the twigs. It is very interesting to study nature; in doing so we will always find something interesting; we will see the unity which prevails in the whole organic world, in animals and vegetables,-- for they are wonderfully alike--and this is because the same divine Power is back of all.

We see another illustration of the wisdom and divinity of the whole plan so far as the diet given to man by the Creator is concerned, in the relation of fruits to germs. God gave man a dietary that would keep him pure,--that would keep his alimentary canal pure and clean and keep his body free from impurities--if we would only follow that diet. Fruits seem to be the means by which God intended the alimentary canal should be kept pure. It is my theory of germs that they came into existence about the time Adam sinned; that when Adam sinned and was sent out of the Garden of Eden into the world to work out his own destiny, ~~that~~ germs were created,--not for the punishment of man, but as a beneficent plan to consume dead plants and animals, and to act as scavengers to keep the world clean and pure, and that through all his wanderings and perversions and his wanderings away from the path of rectitude, these germs, which were formerly intended for beneficent purposes, by degrees developed into enemies,--and the most powerful and dangerous of all the enemies of mankind. But if it were not for germs we would soon be buried deep under a mountain of corpses of little insects and animals that die. And not only that, but the soil of the earth would be entirely exhausted after a time. For the organic world of animals and vegetables form a circulating medium for which the crust of the earth serves as the banker's bank. When a man dies he

goes back into the bank account which is then drawn upon and the circulating medium produced again,--"greenbacks," if you please--in the shape of apples, pears, plums, peaches and seeds of various kinds--you might compare the earth to the Government Treasury, if you please; when an animal dies or an animal dies, then a certain issue of greenbacks is called in and made over into a new denomination,--it is ground up into pulp and comes out in a different kind. So it is on the surface of the earth, and the animals would use up all this material if it were not for this continual change that is taking place. This is an interesting study.

Now we have found, as I have said, when we study the relations of fruits to germs, that fruit-juices are germicidal in character. This discovery, I think, is partly due to the investigations of Prof. Koch. Prof. Koch during the cholera epidemic in Hamburg announced that citric acid was a perfect germicide for cholera germs, and that the juice of lemon--I think about two drams of citric acid in a quart-- pure citric acid-- was sufficient to destroy cholera germs, or rendered them innocuous. The juice of a single lemon in a glass of water allowed to act upon the water for twenty or thirty minutes will render these germs entirely innocuous. Typhoid fever germs and cholera germs are destroyed by the action of citric acid, as he has shown. In our laboratory about a year ago we made the interesting discovery that almost all ordinary fruit juices--all the ordinary fruit-juices at any rate,--the juices of the watermelon, the banana, the pear, the peach, the plum and the cherry etc. are capable of destroying germs--or rather of diminishing their growth. I asked Dr. Heald to prepare a series of culture media for the purpose of testing the different stomach fluids from oatmeal, wheat, and fruits of various kinds, so that we might ascertain why the patient

sometimes says, "Doctor, I can't eat apples," or, "I can't eat lemons," or, "I can't eat bananas," or some other kind of fruit. After a week or two I received the interesting information from the doctor that stomach germs would not grow in fruit-juices--or very rarely so; that stomach fluid inoculated in a bouillon media would produce germs of the most virulent character,--germs that would produce ptomaines and toxins which will kill guinea-pigs and rats, but that same stomach-fluid when inoculated ^{with} ~~in~~ fruit-juice germs cannot live in it. He was investigating for the purpose of finding out why fruits disagreed with certain patients, but, instead of that he found the reason why fruits agree with people,--which was a great deal better and more interesting--to find that fruits were good for all. But it is not necessary to use fruit by itself for this purpose; if you have a mixture of fruit-juices and cereals, germs will grow in it. Germs will grow in a mixture of beef tea with fruit-juices.. Germs will grow in a mixture of milk and fruit-juice.

Now let us see the reason why stomach-germs will not grow in fruits or fruit-juices. Some germs will grow under some circumstances,--for instance, suppose there was yeast present in the stomach,--germs will then grow in fruit-juices; but yeast is not very commonly present in the stomach; it is a rather rare thing in stomach fluids. About how frequently did you find yeast present, doctor?

DR. HEALD: About one in twenty.

DR. KELLOGG: But you did not find it in abundance?

DR. HEALD: No, sir.

DR. KELLOGG: I think yeast is seldom found in great quantities in the stomach, --except in cases of cancer. You remember that in sever

al cases of cancer that we have had, almost a pure culture of yeast has been found; in such cases only we have found a great quantity of yeast.

Q. Then the presence of yeast-germs in large quantities in the stomach-fluid is an unfavorable symptom?

A. Yes, it is a very unfavorable symptom. ^{I don't remember of seeing a patient get well} who had a great quantity of yeast-germs in the stomach-fluid. My recollection is, that in all such cases where we have made observations, the patient has gone home and died; I think it is a very unfavorable symptom...

Now why will not germs found in stomach-fluids grow in fruit-juices? It is supposed that the fruit-juice, in itself, may ^{contain} a certain germicidal property independent of other acids; that I do not know, but we know that the fermentation which takes place in the stomach is, for the most part, an alkaline fermentation, -- we know that it is an alkaline fermentation the products of which are ptomaines. Ptomaines are not acids, are they? What are they? ("Bases.") Yes, and they are entirely analogous to vegetable alkaloids, which are closely related to the mineral bases. So we know that when fermentation takes place in the stomach by which proteids and albumen are destroyed, -- ~~this~~ the only form of fermentation that is seriously injurious -- the ordinary fermentation which is called "sour stomach" never results in a very serious condition, unless there is something more than that, because these acids are not highly toxic; but that form of digestion which gives rise to the worst symptoms is that form in which proteids are decomposed in the stomach and in which ptomaines are formed, -- and this is an alkaline fermentation -- the media must be alkaline; that is the reason germs are found in the stomach in most abundance in hypopepsia instead of hyperpepsia. It is rare to find germs in great quantities in the stomach in cases of hyperpepsia. Possibly sometimes, by accident in the work or the

technique that germs are sometimes found present in hyperpepsia, but not in such quantities as in hypo-pepsia or a-pepsia. So we see that an acid media is, in itself, inimical to the growth of germs. That is the reason some germs will not grow in fruit-juices,--it requires an acid media to check their growth. But suppose we take fruit -juice and dilute it sufficiently, and at the same time add something to it which is food for germs to feed upon,--they will grow. Here we see another reason why fruit-juices are inimical to germs,--they do not contain sufficient albumin upon which germs grow and thrive--and fruit-juice contains only about one-half of one per cent. of albumin--and I doubt whether ordinary fruit-juice contains as much albumin as that. We have, in a pound of grapes about as much albumin as we have in a fresh egg of the ordinary size. So we see two reasons why fruit-juice is inimical to germs,--one is, that fruit-juice is acid, and the other is, that it contains too little albumin. We can readily see that if we dilute fruit-juice and add materials like meat, meat, cheese, egg, or any farinaceous food of any sort--all of which contain albumin--we add something upon which germs can feed, we shall have plenty of germs,--for example, if we should make such a mixture as apples whipped up with white of egg (which is a very common mixture for invalids) what would you think of that as a foundation for the cultivation of germs? ("It would be good.") Yes, it would be good, for the reason that the acid of the apple would be neutralized,--and how would it be neutralized? Is the white of egg acid or alkaline? ("Alkaline.") Yes, and if you add the acid of apple to the mixture white of egg, it will be neutralized by the alkali of the albumin; there might not be enough acid present to coagulate the albumin, but there would be sufficient alkali to neutralize the acid of the apple. My attention has been called to the fact that such a combination is al

most sweet as the result of the neutralization of the acid by the alkali of the albumin. But that is a different thing from hiding the acidity of the apple by the addition of sugar; it is not hidden by the alkali, but neutralized, so there we have a splendid combination for germs.--

Q. How would you give egg with fruit?

A. We ought to administer albumin in a form in which it cannot form acids in the stomach,--and there we have an advantage in the use of nuts, in which, if the nut is thoroughly chewed, it is reduced to a cream, and in that cream the albumin is thoroughly divided and when taken into the stomach it will not be coagulated; or, if the nuts are cooked, they enter the stomach in the form of very fine particles so that the gastric juice will quickly dissolve them and they will pass on. But if we take the white of boiled egg it would be coagulated by the gastric juice; whipped egg would be better than boiled egg, because it would not form a large hard curd.

We find that fruits are advantageous because they are peptogens; they stimulate salivary digestion and the motor activity of the stomach. They are valuable as peptogens to the gastric juice, ~~and~~ They are valuable for the purpose of stimulating the flow of the saliva to some extent, but they are particularly valuable in stimulating the motor activity of the stomach. But we find that perhaps the most important function of fruits in relation to digestion is their germicidal character,--the fact that they destroy germs; so they act as cleansing agents for the stomach.--

DR. PAULSON: Then the albumin in nut-products is analogous to the casein in kumyss?

DR. KELLOGG: Yes; that is a good reason why koumiss is a good agent in cleansing the stomach, and a good reason why koumiss and buttermilk can be taken when milk cannot be taken in any other form,--the acid is not neutralized and this is identical to the development of an alkaloidal fermentation in the stomach and the formation of ptomaines, running out also the ptomaine-forming germs. That is the reason why buttermilk and koumiss are so valuable in cleansing the stomach in certain conditions. They are valuable in the same way that fruit is valuable, in consequence of the acids which they contain.

We must stop a moment and consider the digestibility of fruits. Green fruits are almost indigestible; they are entirely unfit for food, first, because they are not mature; food must reach the point of ripeness and maturity before it is taken,--in other words, the divine curative power which is preparing that food for man's use must complete its work before the food can be taken with safety; we have no right to take it before the Creator has prepared it for us. In the second place, it contains food elements in a form in which they are indigestible; the raw starch of green fruit is indigestible by the saliva and the saliva cannot act upon it, because saliva cannot act upon food when it is in chunks, because it is tough and hard; the saliva then cannot act upon the starch and break it down, and ~~the~~ so the gastric juice cannot act upon the albumin and break it down. (Diagram.) Now suppose this represents a mass of food.--the saliva acts upon the starch, weakening the framework of the mass,--the framework, so to speak, of the albumin; the gastric juice can now find its way to the albumin and digest it, and thus the whole mass is broken down. But suppose the saliva cannot digest the starch,--then the gastric juice does not penetrate the albumin and digest it, because the starch presents a solid wall against

it instead of a crumbling wall. When these two fluids work together,-- first the saliva and then the gastric juice, we have nature's effective means in operation for breaking down food and reducing it to a pulpy mass. Again, in green fruits we have acetic acid, and acetic acid is a precipitant of pepsin and prevents the action of the peptogenic processes-- it prevents the process of peptonization in the stomach. So here we have a substance which is inimical to stomach digestion, and by means of this substance the natural peptogens are prevented from developing, and so we have another reason why green fruit should not be eaten. But by cooking, green fruit can be rendered digestible, because by the process of cooking the starch is converted into sugar. But green fruit when cooked is not a proper food; it has not been properly prepared by the natural process, and so it is insipid in flavor, and so sugar is added to it to give it a flavor; and, unless it is very thoroughly cooked, it is still hard of digestion. Fruits, as a rule, are more easily dissolved when cooked.

The digestibility of foods is improved by cooking, but there are some fruits which are perfectly digestible when not cooked. The most easily digestible of fruits are the peach, the grape, the strawberry, the raspberry, baked apples and steamed figs; these fruits are easily digestible in a raw state. I should say, the baked apple and the steamed fig should be classed together and are the most easily digestible of fruits when cooked, while the fruits which are most easily digested in a raw state are the peach, the strawberry, the raspberry and the grape,--these four. Then you may class with these as the most easily digestible of fruits, the baked apple and the steamed fig,--it is well to put these together--four raw and two cooked. Next to these come the ripe, raw apple and the ripe, raw pear. Very ripe pears are quite easy of digestion. Then so

all the rest of the denits, when properly cooked. The apricot is also quite easily digestible foods. The apricot, the watermelon, the peach, the apple, the pear, the banana. And then there is a large number of tropical fruits,--the papotes and other fruits of that class--which are easy of digestion.

Dried fruits are very difficult of digestion; they require first, to be soaked for several hours and afterwards cooked; they should be thoroughly soaked in cold water before cooking.

Next time we will talk about the adaptation of different fruits to different foods, and the uses of fruits in the removal of disease, and we will find some very practical deductions to be drawn.

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LECTURE TO MEDICAL STUDENTS, May 3, 1898.

Fruits--Their Therapeutic Uses .

J. H. Kellogg, M. D.

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I think I must say that fruits are of the greatest service in the treatment of auto-intoxicants. There is a much larger class of cases of auto-intoxication than is set down in ordinary books on therapeutics. But if you will read DeJardin-Beaumont, Gienard and other eminent recent French authorities upon this subject you will find that a very large share of our acute chronic maladies owe their distressing symptoms to auto-intoxication. In the first place, there are very few infectious diseases which are not produced by a disordered stomach,--and most of our acute maladies are infectious diseases. The body that is in an absolute state of health,--a state in which the blood is pure, and the tissues freed from debris and entirely in a normal state, has a resisting power by which it is able to successfully resist the attack of any germ--that is, of any germ that can be received into the body under ordinary circumstances. Of course it is possible to inoculate a perfectly healthy animal with, for instance the germs of anthrax by means of a hypodermic needle; of course it is easy to inoculate a perfectly healthy animal with these and various other virulent microbes, but a perfectly healthy body is able to resist the attacks of all the ordinary pathogenic germs.

So, in the first place, we must say that a person living upon a fruit diet largely--making a large use of fruits may consider himself in a far better state of defence against infectious disease than a person living upon an ordinary diet. So a fruit diet may be said to be, in the first place, most useful as a preventive of all infectious maladies

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which lead to auto-intoxication.

Now let us consider some of the diseases which may be fairly classed as auto-intoxications. We will first consider the acute auto-intoxications. In the first place, there is the most common of all infectious conditions, ~~self~~ of self-poisoning which is commonly known as "biliousness--an acute bilious attack. I presume there is no other form of general poisoning of the system, ^{so common} as biliousness. We must get thoroughly fixed in our minds the fact that biliousness, whether acute or chronic, means nothing but self-poisoning,--poisons generated in the body. Now what is biliousness--acute biliousness? An acute bilious attack is variously named, according to what particular symptoms are most prominent. What is sometimes called an ordinary bilious attack is commonly accompanied with vomiting; but it may be that the head-symptoms are the most prominent in connection with vomiting, but the symptoms may be more confined to the head. It is then called "nervous headache" or "migraine." These conditions are all the same; there is simply the difference in the prominent local symptoms. There are sometimes cases in which the vomiting is more common than in a bilious attack. If the head-symptoms are very prominent--if we have, instead of vomiting, loss of appetite in connection with the headache, then it is "sick headache,--" that is, headache with a sick stomach. But, if the symptoms are confined to one side of the head, then it is "nervous headache" or "migraine." Most persons suffering in this way will be offended if you call such a condition "stomach disorder" instead of "biliousness." They will say, "I have nothing the matter with my stomach." I think such people are something

like a young lady whom I visited some time ago. I found her suffering from disorders of the stomach. She had been eating all sorts of things I told her that she was suffering from a disordered stomach, and that I must arrange her diet accordingly. She said she knew she had a bad stomach and that she had tried all sorts of diet, but that it was of no use; that it made no difference what she ate, she was not improved by her diet, "and," said she, "I think my stomach is my thorn." Her mother who was with her, said "Yes, Blossom's stomach is her thorn, and I hope the Lord will give her grace to endure it." I saw it was no use to give her a diet prescription. A couple of days afterwards she called to get a prescription for a more acute form of infection. I felt her pulse and looked solemn. I looked at her tongue and told her I was sorry for her; that she looked bad, etc. and rose to leave the room. Then she said, "Aren't you going to do something for me, doctor?" The mother also said, "Aren't you going to do something for poor Blossom?" I said, "I don't know as it would be right to do anything for her." "What do you mean," said the lady. "Why," I said, "Providence has seen fit to send Blossom another thorn, and I would not wish to fly in the face of Providence." But at their earnest entreaty I gave Blossom a prescription for the present necessity. But she would never allow a prescription to ^{be} made for her stomach, and went home some weeks later. Her father afterwards wrote me that "poor Blossom" was starving to death--"Yesterday she ate nothing in the world but sixteen eggs, twenty oranges and--" I forget how many other things--"and she is starving to death."

Now it is amusing to see how many people are willing to admit that they have every kind of nervous disease, but stomach disorder, never. The stomach is the **natural** headquarters of disease, because it is placed where almost everything comes in; it is a doorway to the body. Fortunately a healthy body is able to purify itself of nearly all intercurrents.

all autointoxicants. I want you to note this point: Look for poisons from the outside, because the body purifies itself and keeps itself clean in a wonderful manner when in a healthy condition,--for instance, the old skin peels off and gives place by clean, new skin; the old mucous membrane is continually peeling off and giving place to a clean, new membrane. The body grows from within, outward, like an apple. Everything inside of the apple is clean,--it is canned; it has an impervious covering which stretches and stretches and stretches while the body grows. And the body grows in the same way,--only the body has more elaborate methods of growth than fruits,--for instance in its method of keeping itself clean.

Now, as I have said, the most common form of autointoxication is an acute bilious attack,--migraine, sick headache--all mean the same thing. In this condition we have poisoning resulting from the absorption of poisons from the stomach. In these cases patients do not complain of sour stomach, and think there is nothing the matter with their stomachs. There is no acid nor gas in the stomach, and there is no pain in the stomach. Why? Because gas, and pain and sourness in the stomach are the result of acid fermentations. And acid fermentations do not produce general symptoms; they produce only local symptoms,--and why? Because these acids--for instance, butyric acid and lactic acid--are not very serious poisons, and the acid formed in the stomach is not very seriously poisonous. So the pathological effects of these acids, as I have said, are only local symptoms. These call the attention of the patient to the stomach and he thinks he has nervous disorders. On the other hand the poisons formed in the stomach are the result of alcoholic fermentation. The products of starch fermentations are gases in the first place; these are afterwards decomposed and become alcohol and finally an inflammable

gas is produced. I wish to have a series of experiments that I want to have undertaken on that subject. Hydrocarbon is formed,--but more commonly other gases are formed in the fermentation of starch which produce local symptoms.

Now these autointoxications are the result of the fermentation of proteids,--of the albuminoid substances and of the nitrogenous substances--albumin, fibrin and casein; it is the result of the fermentation of these substances. As you know, the fermentation of proteids is, for the most part, alkaline fermentations. You would not expect to get a growth of the bacillus coli communis in a strongly acid medium. The for the microbes that are most commonly found in the stomach fluids do not well grow in a strongly acid medium; they will grow only in a slightly acid medium, or one that is slightly alkaline, and the products or ptomaines which, in small quantities are absorbed into the body, produce very serious **systematic** symptoms, but which produce no local symptoms at all, because, as you know, ptomaines are simply alkaloids, and they are not directly irritating. but their toxic effects are experienced when they are absorbed into the body and come in contact with the nerve-centers and the nerves. So we see the reason why persons suffering from acute and chronic ^{now} autointoxications do not attribute the origin of their disease to the stomach,--they feel nothing wrong in their stomach. I have often been told by people in this condition that they could digest everything that they could chew. One person told me that he could digest wrought-iron nails if he could chew them; that he could digest anything that he could eat; that he could eat anything that he wished and digest it. "And you do eat anything that you wish," I said. He said he did. This alkaline fermentation, which started in the stomach, continues right along into the intestine, because in the intestine they find a media

which is favorable to intestinal dyspepsia, the cause of which is always found in the stomach. The reason for that is, that these simple indigestions are always associated with infections in the stomach, and if the stomach did its duty and disinfected itself thoroughly and destroyed all the microbes present in it then there would be nothing to infect the intestines. Some of you know how it is with young children. The Examination of the fecal matters of the newborn babe show the presence of no microbes. Now what are the first microbes found in the fecal matters of a child? The same microbe which dwells in the colon during the whole life of the individual,--the bacillus coli, or bacillus of the colon; that is the first microbe found in the ^{which is found} fecal matters of the child. Where does it come from? It comes from the stomach, because it comes from the food and from other sources and materials which are taken into the stomach,--it may be that it is in the air, because fecal matters are scattered about on the ground where they are left by animals. The colons of all animals contain this bacillus, and the dust of the air always contains the colon bacillus. So the child gets this bacillus into its mouth by its hands with various other things which it puts in its mouth, and very soon the intestinal tract is infected. If the stomach were capable of destroying all these colon bacilli then the whole intestinal tract might be kept clean forever, and absolutely pure forever. I believe if a child was born on a mountain top where everything was clean and pure, and was fed on a pure diet from the beginning of its life, that the number of microbes found in the alimentary canal would be ~~se~~ small, and the number of ptomaines produced there would be small in quantity, and, as the result, the child would be far better able to preserve himself intact; the system would be able to

resist disease,--but I will take that up later.

DR. PAULSON: That point is so practical that I hope every one will get it. I find it very difficult to convince this class of patients that there is anything the matter with their stomachs, or that the alimentary canal is diseased.

DR. KELLOGG: It might be well, in such cases to make a few cultures of stomach fluids and then examine the media. We have done so, and upon examination of the test-tubes and the media we find in some of them a great quantity of gas, and in others, very little gas, and yet if some of the contents of those test tubes in which very little gas is formed were injected into a rabbit, death would follow,--a guinea pig or rabbit would be killed by such an injection. A beef-tea culture of stomach fluid injected into a rabbit or guinea-pig will produce death. I have had many such cases. Dr. Heald continued that investigation for some time, in consequence of which he and other Laboratory friends who had been investigating the effects of meat eating that they became such strict vegetarians that they thought it was not necessary to take life at all, and they could go on with their investigations without taking life. I don't believe in taking life; I have recently found a method of determining urinary toxicity without taking life.--Mr. Dunlap will you give us your experiment and its results?

MR. DUNLAP: We took 4 1-2 c.c. of urine, and we placed in that 1 1-2 c.c. of sulphuric acid; we added it slowly and kept it cool-- so it wouldn't overheat. We afterward added 1 1-2 c.c. of chloroform, shook it thoroughly and allowed the chloroform to settle to the bottom of the tube. It will then assume a blue color if the urine is poisonous; if it is not poisonous it will not assume such a blue color. The color of that

bottom sediment determines the intensity of the toxicity.

DR. KELLOGG: A very light blue color indicates a normal toxicity. We are trying to make a graduated standard.--There is one feature of this method to which I would like to call your attention: I will give you the proportions.--Take a certain volume of urine; then take one-third as much sulphuric acid--one-third the volume ^{of urine} of pure, concentrated sulphuric acid--and as much chloroform as sulphuric acid--equal parts of chloroform and sulphuric acid, adding the sulphuric acid slowly; cool it carefully and then add the chloroform.--Why would you cool before you add the chloroform? So the chloroform will disappear. Perhaps Mr. Dunlap will bring us some experiments to-morrow morning.

Q. How do you know that there was toxicity?

A. Because indol and indoxyl sulphate would be indicated. A French investigator finds that this is a good test. You could see, in trying this test for urine that if a person didn't drink much water there would be but a small quantity of urine and but a small toxic value would be indicated. So I take a definite standard,--1500 c.c. as the normal quantity of urine for 24 hours for a person weighing 150 pounds. Then dividing 1500 by 10 we have 10 c.c. ^{of urine} for a pound weight. So the patient must be weighed, and the urine weighed, 10 cc of urine representing each pound of weight; and if the urine cannot be weighed it should be diluted so as to be in proportion to the weight of the patient.

Now first we will consider the use of fruits as a protection against disease: The large use of fruits is one of the means with which God has especially provided us for the purpose of preserving us intact against disease, for keeping the alimentary canal in a pure state, and so preventing the flooding of the body with poisons and thus preparing the way for disease. Now in relation to biliousness: This condition

relates to the stomach particularly. Now there is a class of auto-intoxications, the chief seat of which seems to be the alimentary canal, below the stomach--~~for instance~~ ^{in such diseases as} diarrhoea, in acute diarrhoea or dysentery--and the various forms of intestinal inflammation, acute inflammation, cholera morbus, cholera infantum, and in cholera itself, and in all forms of acute intestinal inflammation, of acute intestinal catarrh, in so-called "winter cholera," and in the ordinary "summer complaint" of children or ~~summer~~ summer complaints involving intestinal irritation--diarrhoea in its various forms.--these are intoxications--that is, when the symptoms from which patients suffer--the fever, for instance, and the subnormal indications--they are due to intoxication, and the great danger is from these intoxications; if the patient dies, he will die from auto-intoxication. When the fecal matters are in a fluid state the absorption of poisonous substances takes place with great rapidity. Please remember that, and it will be of great service to you in a good many cases. ^{of these} It would explain to you incidentally, why certain symptoms have suddenly appeared,--for instance, a patient has been going on all right for a time, when suddenly he is very sick and almost thinks he is going to die, and you will find by investigation that he has looseness of the bowels. Now nature has provided the alimentary canal with mucus to facilitate the exit of the bolus rapidly and in a semi-hardened state so that only a small portion of the alimentary canal shall be exposed to infection. ^{the fecal matters are} But when in a fluid state a larger portion of the alimentary canal is exposed to infection. The same thing is true when an enema has been given and the fecal matters are dissolved and are not passed off quickly. If these fecal matters are not discharged at once,--if there is a great amount of these toxic fecal matters left in the colo-

Not having been washed out by the enema the patient will be made sick because the colon has not been properly washed out.. Such patients often say, "An enema makes me sick; it gives me a headache and I can't get over it for several days." Now in such a case we must simply wash out the colon thoroughly. If the contents of the colon are not completely discharged at once, give another enema. It may be that the colon will be so dilated and the walls so relaxed that it cannot contract, and we sometimes find to our sorrow in hemorrhoidal operations that it is impossible to get the colon to empty itself. In such cases the thing to do, is, to repeat the enema again and again and again so that the colon will be thoroughly washed out. If you do that, you will be surprised to find that the patient will not suffer from auto-intoxication resulting from the absorption of ptomaines which are set free in the intestines. If the enema has been repeated several times and the bowel is not emptied, introduce cold water carefully, adding a little soap to the water, reducing the temperature to about 80° and in some cases perhaps as low as 60°. A small quantity of this enema will stimulate the colon and lead the stomach into a torpid condition. Don't use water at a temperature much above that of the body in any case, as it is likely to excite the patient to sweating, and the addition of too much heat by a hot enema is equivalent to a hot bath. The temperature should not be above 105° to 110°. The temperature of the water should be as near the temperature of the body as possible, and it is equivalent to a neutral bath and produces no reaction either upward or downward (a cool enema producing a reaction upward and a hot enema, downward.) A neutral temperature is about 100° inside the body and about 98° outside of the body.

Q. In giving the enema would not the cold water be apt to stimulate the muscles to contraction?

A. Yes,--that is what you want the cold water for; that is the object of injecting the cold water. Of course it wouldn't stimulate absorption; it would lessen the power of absorption, because it would close up the valves of absorption to some degree. I have used a graduated enema using the ordinary temperature at first, then lessening the quantity and lowering the temperature each day, beginning with a half a pint at the ordinary temperature. You can gradually wean a patient from the enema. Never leave a patient until he has completely gotten rid of the enema; don't send him off using the enema because the bowels might be relaxed by the continual stretching of water; and the patient might find it necessary to use more and more water in order to stimulate the bowels; lower the temperature and lessen the quantity,--but I am wandering. However, this has something to do with auto-intoxication,--both ends of the canal must be kept thoroughly clean in order that the state of body-purity may be maintained. Wet fruits are the means by which the whole alimentary canal may be kept clean. The residue of fruits which is deposited in the colon does not encourage the development of ptomaines; it does not encourage the development of the bacillus coli communis, it being an acid residue, so that fruit-skins, ^{etc} ~~and~~ ~~seeds, etc.~~ may be carried into the colon and limit the growth of microbes there. So fruit is a disinfectant of the whole alimentary canal.

We have spoken of the influence of a fruit diet in acute infections of the stomach and intestines, but all sorts of acute indigestions

are real infections. Every case of acute indigestion, and the symptoms with it,--the headache, prostration, weakness and nausea--are all symptoms of auto-intoxication and are all amenable to treatment by a fruit diet... A boy will fill his stomach with cherries, strawberries or some other fruit and he will have, perhaps, a little gaseous fermentation in the stomach, and he will have a little alcoholic fermentation, perhaps, but his stomach will stand it. He will be very uncomfortable for a short time, but he will recover over night, and the next day he will be ready to attack the cherry tree again and fill himself as before without permanent injury. If it were a case of proteid infection, or "Thanksgiving-infection" it would take him several weeks to recover from it; he would have a coated tongue the next morning; he would have something of a fever, perhaps, and would not get over his difficulty, perhaps, without a short attack of diarrhoea after repeatedly filling himself with fruit, and he would become a little bilious or icterous. It is common for a person to become very sick by gormandising meat, but a person may gormandise fruit and nothing serious will happen; there is no general infection.

There is another class of acute auto-intoxications to which I wish to call your attention, viz., the whole class of fevers,--all fevers--fevers of every description, such as typhoid fever, malarial fevers, so-called eruptive fevers and all the infectious fevers. You know fevers are almost always infectious; I do not at this moment recall any fever that is recognized as a fever, that is not an infection. The majority of fevers are included under these two classes,--malarial fevers and infectious fevers. We have another class of fevers which are just coming into recognition,--a class of fevers arising from ~~the action of~~ *infection* by

the colon bacillus. The French Medical Colleges recognize the bacillus as productive of fevers, coli, and are giving attention to the study of this subject, --that of fevers arising from ~~the action of~~ ^{infection by} the colon bacillus. Investigations made some years ago showed very clearly that there is a very close affinity between fevers arising from **infection by** the colon bacillus and fevers arising from Eberth's bacillus, --typhoid fever. Three or four years ago I read a paper on this subject before the American Public Health Association ^{at its meeting} in the City of Mexico, and I would like to have you read that paper, --not because of what I have said in it, but because of the authorities which I have quoted on the subject; You will find this subject an interesting one; it has grown immensely since that time, and it is now recognized as a fact that the fever arising from the action of the colon bacillus is not the same as typhoid fever. The question was, as to whether the colon bacillus was not the cause of typhoid fever. This is another class of fevers which you will sometimes meet; you cannot say that it is typhoid fever; it don't appear exactly like typhoid fever. But it is evident that it arises from infection by the colon bacillus. Why so? Because the body was in such a condition that the colon bacillus was enabled to develop such a virulent stage that it became a pathogenic germ; it is always ready to become a pathogenic germ. If it is not a pathogenic germ all the time, it is because it is restrained by the resistance of the body. The colon bacillus, when the resistance of the body is diminished to a sufficient degree, may produce pneumonia, pleurisy or hepatic abscess. That is what sometimes happens after an operation for hemorrhoids; the colon bacillus infects the abraded surface, and it produces pericarditis, peritonitis, etc. So-called hydropathic peritonitis, is, in a majority of cases,

due to infection of the colon bacillus, as there is but a thin wall separating this bacillus from the peritoneum. And appendicitis is perhaps always due to the fact that the appendix has first become weakened by disease,--that portion of the body has perhaps become weakened by catarrh or some irritant, whatever it may be; it may be by the deposit of mercurial salts in the caecum, or from other causes--for instance, the accumulation of fragments of meat by which decomposition takes place; but, for some cause, resistance of this part of the body has been lessened to such an extent that the colon bacillus is able to assume a virulent form there, and then inflammation takes place. So we must remember that this trouble is a very common form of intoxication; it is an intoxication arising out of an infection from the colon bacillus. This bacillus is always in the colon; it is always present in the colon, and ready to produce infection when the condition of the body is sufficiently weak. So we live, so to speak, close to a precipice;--there is a precipice right in our bodies which is capable of producing deadly effects, and our only safety is to keep above it, and to live up to a point at which infection cannot take place--we must keep our vital resistance upon a high level.--

Q. Has it been found that this bacillus produces pneumonia?

A. Yes, it produces pneumonia and pleurisy;--I had a case some time ago which illustrates this fact--a case in which the patient was suffering from pneumonia. Of course pneumonia is a somewhat different type of fever from that produced by the colon bacillus; it is the result of infection by the pneumococcus;--but there is more than one germ which is capable of producing pneumonia. You can produce croup without the Loeffler Bacillus, and simple pneumonia without the colon bacillus.

In malarial fevers, in typhoid fevers, in those fevers in which patients suffer from infection of the colon bacillus, in diphtheria, in whooping-cough,--in any form of fever manifested in disease, there is, as we all know, a toxic agent which has produced it, and it is this toxic agent which ^{gives} rise to the symptoms of fever,--which causes the rise of temperature, headache and the majority of symptoms which are present--these are due to ptomaines or toxic substances circulating in the blood.

In these cases it is very important to give the patient a fruit diet, and, for several reasons: First, it will stimulate the action of the kidneys to eliminate the poisons. In the second place in all fevers the ability of the stomach to disinfect its contents is lessened. Patients suffering from fever have hypopepsia, so it is very important that the patient should take a diet which is not capable of decomposition,--which is not capable of proteid fermentation--which will prevent that kind of fermentation and destroy germs which are capable of producing ptomaines in the stomach,--and this diet is a fruit diet..

Another reason why we should ^{prescribe} a fruit diet in these cases, is because by the use of a fruit diet we may sustain the patient, as fruit contains sugar and dextrin to some extent, and these are very grateful to patients in fevers. In fevers we have an excessive combustion of carbon--an excessive burning of fuel--and we need constant supplies of fuel, and we should supply it in the form most easily digestible. The saliva is not active in these cases, in the conversion of starch, so if we give the patient fruit, we give him starch in the digested form. The principle substance in starch is levulose, which does not require the action of the saliva. Levulose and glucose are the sugars of starch, and the saliva can do nothing more to the starch after it is converted into levulose glucose and maltose, so you see the work of the saliva has

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been performed already, when fruit is taken.. In these cases fruit is better than farinaceous food. Fruit diet and fruit-pulp may be used in all these cases; and a patient may live very well for a week or two on fruit, in fevers,--but we will take up this subject again. Fruit is certainly one of the greatest blessings that God has given to man, and one of the most wonderful means that we have in our hands for combating both acute and chronic diseases.

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LECTURE TO MEDICAL STUDENTS, May 3, 1896.

Fruits--Toxines, etc.

J.H.Kellogg, M.D.

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The first attempt made to determine the toxicity of the urine was made by Bouchard. I will explain this method to you. This method consisted of injecting a quantity of urine into the veins of a rabbit until the death of the rabbit occurred. The injection was made into a vein slowly and regularly at the rate of 1 c.c. per second,--not all at once, but at the rate of 1 c.c. per second; it must not be injected slower than that, as the kidneys might eliminate it as rapidly as it was introduced, if introduced too slowly, while if introduced too rapidly it might drive the blood too rapidly out of the vessels and the indication would be incorrect. In using this method, you should first determine four things.--

1. In the first place, **note the** quantity of urine produced by the patient in 24 hours.
2. **Note** the weight of the patient.
3. **Note** the weight of the rabbit, and
4. Determine the exact amount of urine required to kill the rabbit.

Having noted the exact weight of the rabbit, and noted the exact amount of urine required to kill the rabbit, then the amount of urine required to kill the rabbit is divided by the weight of the rabbit in kilograms, and that gives us the amount of urine required to kill a kilogram of rabbit,--and that is what we want to know. Rabbits differ in weight, hence the amount of urine, in cubic centimeters required to kill the rabbit is divided by the weight of the rabbit in kilograms, and that

gives the amount of urine required to kill one kilogram of rabbit.

The next thing we want to know is, How many kilograms of rabbit can be killed by the entire amount of urine passed in 24 hours; so we divide the total amount of urine passed in 24 hours by the amount of urine required to kill one kilogram of rabbit. That tells us how ^{many} kilograms of rabbit would be killed by the entire amount of poison eliminated by the kidneys in 24 hours, in the case of a single individual.

Next, we want to know the amount of poison eliminated by one pound of patient, so that the patient can be compared with another patient,--we want to determine the toxicity of a kilogram of patient. We divide the amount obtained by dividing the amount of urine produced by the patient by the quantity required to kill one kilogram of rabbit by the weight of the patient in kilograms, and that gives us the amount of rabbit that will be killed by the poison produced by one kilogram of patient in 24 hours (?). That is a definite thing that can be determined, and thus determine the uric-acid coefficient. That is a brief statement of the method. (Reviewing and placing figures and formulae on blackboard.)

Now what is the chemical test based upon? What is the indicator? What is found in the urine which is an indication of putrefaction taking place? Indican.. When sulphuric acid is applied to urine it undergoes a change,--it is converted into another substance, and this substance is known as potassium indoxyl sulphate. (I will write down the formula for you.) This test depends upon the presence of indican in the urine. This indican, as I have said, is converted into potassium ^{indoxyl} sulphate by the application of sulphuric acid. This substance is then dissolved by chloroform,--the chloroform washes out this substance, ^{which} ~~and then the chloroform~~ being the heavier substance, settles to

the bottom and you have a concentrated substance which gives a blue color. This is a method which has recently been proposed as a test for indican. This method of washing out and getting a blue color is a new method by an Italian,--the Professor of Primavera. This method shows us the presence of indican in urine, but it does not give us a correct indication of the amount, so I have suggested the following, as a modification of this method: When the secretion of urine is below the average (1500 c.c. in 24 hours for a person weighing 150 pounds), add distilled water, diluting the urine proportionately to the weight of the patient, each pound represented by 10 c.c. If the secretion is too great, evaporate the urine proportionately. By this means we can obtain a definite standard. I hope this method will replace Bouchard's test. I can see that in case of albumen being present in the urine, it would be very hard to compare it with the standard,--if you undertake to remove the albumen before applying the test you might remove a quantity of indican along with it.--

Q. Is indican a good indicator of poison--

A. It indicates poisons in the alimentary canal.

Q. If the indican is all dissolved and carried to the bottom, wouldn't it be just as well to take a larger quantity of urine when the amount secreted is too great, as it would to evaporate it?

A. That suggestion might be of value,--but we must observe the proportions. (Illustrating by blackboard calculations.)

Q. Is a high coefficient a good indicator?

A. This is an interesting question; it is related to this question of diet, so we may talk about it a little. The question is, Is a high coefficient favorable or unfavorable? That depends upon circum-

stances,--for instance, suppose here is a patient suffering from pneumonia, and we make an examination of the urine and we find an unusually large urotoxic coefficient,--that might indicate that the patient has passed the crisis and that the kidneys are rapidly eliminating the poison. Then suppose we have a very low coefficient,--that is a very unfavorable ~~condition~~ ^{indication}--a low coefficient is always an unfavorable indication; it shows that the body is not eliminating, with sufficient rapidity, and hence, that there is an accumulation of toxic substances in the body. This is always unfavorable, but an excessive toxicity of the urine is not always an unfavorable indication,--it may be a favorable indication; it may indicate one of two things: It may indicate either that the system has recovered itself and is eliminating poisons from the body and is catching up with its work, so to speak, or it may indicate that there is an unusually large quantity of poisons produced. A high urotoxic coefficient indicates, as I have said, either that the system is eliminating an unusual quantity of poisons--not producing an abnormal quantity of poisons, but simply eliminating ^{poisons stored up,} them, or, that there is some cause in the body which is producing an unusual amount of toxic matters; so it is important to keep this in mind.

Now how will you determine which of these things is taking place? It is fair to say that whenever you have an unusually high coefficient of toxicity of urine that there is, at the same time, an unusually high toxicity of the tissues, because the urine is simply an extract of the tissues. And if the urine contains more than the usual amount of poisons, the urine having come from the blood which bathes the tissues, we might expect that the blood will be made as pure when the urine is unusually toxic, as when the kidneys are required to eliminate only the ordinary amount of toxic matters.. So, if there is a large amount of

toxic matters in the urine there is probably a large amount of toxic matters in the tissues. We must study the patient and see whether there is any pathological process in operation in the system of the patient which will produce unusual toxicity. Some of these things we considered yesterday,--for instance, looseness of the bowels.

There are three things which are particularly productive of the accumulation of poisons in the body or in the alimentary canal: A weakened condition of the eliminative organs, a dilated condition of the bowels, and a fluid condition of the fecal matters in the colon. Bouchard says that has shown that if food-substances are retained in the stomach more than five hours decomposition and poisoning take place. This is not true when the fecal matters are hardened in the colon; they may be retained there for more than five hours without the patient giving evidence of poisoning. But when these matters are fluid, and are discharged in their fluid state, the patient gives evidence of poisoning. I once knew a case in which the patient's bowels did not move in three months, and after that, by an almost continual discharge of fecal matters his weight diminished 75 or 80 pounds. But this is a curative process in these cases and the patient is not exceedingly sick. These are fundamental questions. The discovery of the relation of the toxicity of the urine to acute and chronic diseases has explained more therapeutic processes than any other thing that I know of that has occurred in modern times; it has opened up a great field of light, and it is important for us to be thoroughly posted in these matters.

Now let us take up the conditions of auto-intoxication: Biliousness is a very common condition--nervousness and sick headache. We should know that these conditions are almost universally connected with a dilated state of the stomach, or a prolapsed state of the stomach, and the

philosophy of the patient's symptoms is based upon the influence of these toxic substances upon the sympathetic nervous system. Some one will say that migraine is a sympathetic nervous disease, ~~or symptom~~, --

Very true; but what causes sympathetic nervous diseases? These diseases are not primary maladies, but are secondary maladies; they are symptomatic conditions. Prof. Nova started me on the right line in this respect. Nervous diseases are only symptoms in a majority of cases. We must get back to original causes. So when we say that nervous headache is a nervous disease or nervous disturbance of the sympathetic nerve-centers we must find out what causes the sympathetic nerve-centers to be so disturbed. It may be caused by a prolapsed stomach pulling upon the nerves, and it may be caused by the retention of food in the stomach for too long a time. If you have a case of migraine or nervous headache, the thing to do is, -- not to begin dosing the patient with drugs to stupefy his nerves -- he already has poison enough in his body -- but treat him in such a manner as to enable him to eliminate the poisons as fast as possible. What I have been saying in reference to the use of fruit in these cases does not refer to the time of the immediate attack, because while the patient is suffering from a bilious attack he don't care to eat anything; in a majority of cases he does not want anything for a day or two. And, in the case of migraine the patient has had an enormous appetite for two or three days, but at this time he has not much appetite, so what has been said in reference to the use of fruits in such cases refers to their use some time after the attack -- after the alimentary canal is relieved and the patient has an appetite. We might adopt two methods of relieving the alimentary canal, -- we might starve the patient, or we might give him drugs. We might give him large masses of charcoal which is less harmful than drugs, and the least harmful of ~~its class~~ ^{anesthetics}. We might give him doses of salicylate

of bismuth, or phenol, or any one of a dozen other anesthetics which have been recommended for this purpose. These anesthetics have a sort of value, but the trouble with them is, that they, as well as germs, poison the patient. Chloroform has been used for this purpose, and has been highly recommended. Fifteen drops of chloroform taken three or four times a day will benefit a patient with a coated tongue. But this whole philosophy of trying to stupefy germs temporarily is wrong, because it does not reach the cause of the trouble. Another method employed is that of washing the stomach; but if we use this remedy we must wash the stomach out after every meal, because there are fragments of food left behind. Patients sometimes get wonderful comfort from washing out the stomach; they get so much relief from this measure that they actually get addicted to the stomach-tube, and they would not think of going through the day without washing out their stomach the first thing in the morning, no more than they would think of going without washing their face. They find great advantage in washing their stomach; they find that it gives them a clear head and they feel like a different person. Let the stomach of such a person go without washing three or four days and perhaps a bilious attack occurs. That is a good remedy for a palliation, but it does not strike at the root of the difficulty.

Q. At what time would you wash the stomach out ?

A. At night. It should be done, generally, about six or seven hours after a meal, because these patients have slow stomachs, and if we are going to wash the stomach out, we must not do it until the patient

has had some of the good of his meals. I have known the washing-out to be done so soon after the meal that the patient didn't get any benefit from it; we must remember that in these cases especially, the food passes out of the stomach slowly, and washing it out three or four hours after a meal would be too soon, for, as I have said, there is motor insufficiency of the stomach in these cases and the food moves but slowly along the alimentary canal.

A STUDENT: We have a patient at the Sanitarium who has had a peculiar experience in taking a stomach-wash; she seemed to have a sort of nervous spasm after the operation; she complained of soreness at the back of the neck; she used a large quantity of water,--she used to empty a pitcher of water into her stomach,--and then she would go into these spasms; what was the cause of that?

A. This is due to the effect upon the sympathetic nervous system.

STUDENT: She has remained unconscious about three hours after each one of them.

DR. KELLOGG: That is what a French writer calls "nervous apoplexy." We understand apoplexy as being a disease due to the rupture of a vessel, but French medical writers understand that it is due simply to the disturbance of the nervous system. I have seen a good many cases of this kind; they are cases of "nervous apoplexy." There is probably a sudden contraction of the bloodvessels which supply the brain and certain nerve-centers. We know that in epilepsy when there is a general spasm of the body there is anaemia of the brain at first, and there is afterwards a reaction in which the patient becomes flushed, but at first the patient is anaemic, and it is probably an anaemic condition which brings on the paroxysm.

Sometimes we have, at the Sanitarium, patients who eat anything they ~~wish~~ wish, and then wash their stomachs out. We had a patient here several years ago who had a very badly dilated stomach, and I put him on a very strict dry diet. That was a good many years ago, when we were first beginning to use the stomach-tube--some ten or twelve years ago; the stomach-tube was quite a formidable thing then; we didn't have any siphon arrangement,--that is rather a modern thing. Well! As I said, I prescribed a dry diet for this patient, but I learned from the waiter that he ate a great many things that I didn't prescribe. I asked him if he followed my prescription? "Exactly," he said.--"Doctor," said he, "I am following your prescription to the letter." Then I suggested that perhaps his appetite might get the better of him and that he might have digested sometimes. Then I told him what the lady in charge of the dining-room had told me. He then explained the matter by saying that he got what had been prescribed for his health, and then he got what he liked, ~~measured~~ measured it carefully, swallowed it, used the stomach-tube and carefully ~~measured~~ measured it all back again. ,--said he "I see that it all comes back again, and then I eat what you prescribed, for medicine." There are many patients who are pursuing practically the same course year after year, only they wait three or four hours after a meal before they introduce the stomach-tube. A lady who was similarly minded came to me some time ago and wanted to be instructed in the use of the stomach-tube, as she said she might need it sometime. I told her to follow her instructions and she would not need a stomach tube after she got home. She said she might want to go out among her friends and eat ice-cream, cake, etc, and might wish to wash it out with the stomach-tube. I told her it was much better to follow her present instructions. Now there are people who want to go on in this way, and the result is mischief--this use of the stomach tube. By-and-by the muscles of the

oesophageal opening become relaxed,--they lose their power to contract. the patient vomits easily and the whole process of the stomach becomes deranged. And by this means the stomach loses the power to empty itself through the pylorus; there are cases of this kind,--in which the stomach loses its power to empty itself. After the stomach tube is habitually used the stomach seems to expect the tube to empty it upwards, and so loses its power to empty itself downward into the intestine. As the result of being repeatedly emptied mechanically, the stomach finally becomes relaxed, inactive and unable to empty itself. I hope to-morrow to be able to finish up the subject of auto-intoxication in Relation to Diet.--Let me say, however, by way of finishing up what we have been saying:--

There are several ways of dealing with auto-intoxication, ^{resulting from} in reference to decomposition of foods in the stomach. We might employ mechanical means; we might employ drugs, or fasting. Fasting, as a remedy in these cases was known to physicians fifty years ago. It was then largely employed by the water-cure doctors; it was known as "The Hunger-Cure." There has been an attempt made to revive this "Hunger-Cure" in modern times. In the absence of any other method, it is the proper remedy. I have often resorted to the use of this remedy in cases of biliousness which compels the patient to adopt this method by taking away his appetite. Now the use of a fruit-diet is the best method of fasting; it is a fasting without hunger,--it is feasting while fasting. In a fruit diet, as we have learned, we have but little nitrogenous element, consequently we have not in fruits an element which supports proteid poisons--indican, etc. But we have, in fruits, a natural disinfectant, and a natural means of starving out the germs which infest the stomach and

Natural
 alimentary canal. And this remedy is superior to any other, because
 while it starves out the germs, it at the same time stimulates the kid-
 neys and liver to do their work of destroying ptomaines and eliminat-
 ing toxins, and so, maintaining a condition of stomach and tissue-
 purity.

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LECTURE TO MEDICAL STUDENTS, May 4, 1898.

Fruits--Autointoxication in Relation
to Diet .

J.H.Kellogg, M.D.

--X--

We have been talking about Autointoxications due to acute conditions; we have also been speaking of intestinal infections, etc., and a little upon the subject of fevers. In this connection I might mention an interesting circumstance,--that away back in the early part of the Christian Era, as far back as Pliny and Galen--intestinal troubles were cured by fruit. Doctors found, two thousand years ago, that fruit was an invaluable remedy for intestinal infections--although they didn't recognize them as infections. And in the sixteenth century Forestius treated diarrhoea and other bowel troubles in this way.. Pliny, in the first century of the Christian Era, tells about the use of fruit in his day, in all kinds of bowel disorders. Galen, and other German physicians, in the Middle Ages resorted to the use of fruit in these cases. This is one of the most interesting of all the forms of medical dietetics that have come down to us from ancient times; and it is one of the most valuable and most efficient. One of the most ancient and hoary-headed, if you please, of remedies for this class of diseases, is the fruit dietary. I might mention cases of soldiers in time of war, who have been suffering from "camp dysentery" who resorted to a fruit dietary with success. During the late Rebellion, when these attacks came on, and when it was in peach-time, if our soldiers happened to encamp near a peach-orchard, they would take possession of the peach-orchard, and ^{if they} ate plentifully of the peaches ^{they} and were cured. So peaches came to be pre-

scribed for camp diarrhoea.

A STUDENT: Some of the soldiers ate blackberries and were cured of camp dysentery.

DR. KELLOGG: Yes,--any sort of fruit.

Now, in regard to fevers: All kinds of fevers are amenable to the benefits of a fruit diet. Remember that,--no matter what sort of fever it is--~~it may be malarial fever~~; fruit is beneficial in such cases, ~~Why?~~ Because a fruit diet aids the stomach and disinfects it; malarial fever begins in the stomach. It has been frequently shown by the observations of many physicians, that ⁱⁿ malarial localities, like the Gold West Coast of ^{West} Africa--one of the worst localities, because of the prevalence of this fever--it has been shown by the best French physicians who have borne their testimony in our times, that malarial fevers begin with indigestion; they begin with a failure of the stomach to disinfect itself. Why? Because malaria is introduced into the stomach through water, and not through the air as is generally supposed. Br. Kerr wrote me that he was protected from malaria in that country so long as he drank boiled water, but that he was once thirsty in a place where no boiled water was obtainable, and so he drank a quantity of water from a stagnant pool by the roadside, and in a few days he had a most malignant form of malarial disease and nearly died. We should none of us run such a risk as that,--unless we keep our stomachs right. But I think we ought not to run the risk of drinking bad water, for the reason that very few of us have right stomachs; we ~~have~~ unfortunately got bad stomachs ~~from our fathers~~ when we were babies because we were so badly fed. Some observations which have been made abroad within a very few weeks have shown that dilatation of the stomach is an exceedingly common thing in

babies. In one European Hospital post mortem examinations were made of one hundred infants, and eighty out of the hundred were found to have dilated stomachs. Of course these eighty babies died of intestinal disorders. So the hospital doctor prescribed, as one of the sovereign remedies for this trouble, lavage or washing the stomach for young patients--and the younger the patient the better and the more easily the operation could be done. In infant asylums this has been done for several years back. I have done this myself, and have found it possible to do it, in the case of children with dilated stomachs,--and with all the good effects that washing the stomach secures in older persons.

I want to impress this point: That in the majority of civilized people with more or less disordered stomachs, and dyspeptics,--nearly all of them have dilated stomachs.

Now, with reference to typhoid fever: Bouchard has shown that nearly all the people suffering from typhoid fever have dilated stomachs, and I think we may put it down as a principle, that no one can have typhoid fever if he has a perfectly sound stomach; that typhoid fever begins with a disordered state of the stomach. So if we keep the stomach clean and pure and healthy by a fruit dietary we may expect that typhoid fever will be prevented. But, more than this: When a person has already acquired typhoid fever, he is laboring under a typhotoxin, and if he ~~can~~ will adopt a diet which will discourage the growth of germs which produce this poison and at the same time a diet which is nourishing and easily digestible, it will be best to do so. Fruit soup is a good diet for persons suffering in this way. Fruit-soup is made and used in Germany. We use it in our ~~house~~ also. Sister Louise brought it to us; she was raised in Germany where they made this soup. She has often been

with us and made this soup for us. That is where our idea of fruit-soup originated. I afterwards learned that the best German ~~authorities~~ medical authorities treated fevers in this manner,-- that they prescribed fruit-soup, and it is universally used there, in these cases. I have also since learned that the same remedy is used in Scandinavia.--

DR. PAULSON: I have had fruit-soup ever since I can remember; was brought up on it.

DR. KELLOGG: This soup is made by the combination of one part of dried fruit with four or five parts of water,--using dried apples, or prunes, raisins, etc--and have them boiled a long time. The fruit should be soaked over night; then boil thoroughly until the dextrin and the sugar is dissolved, and you have a very toothsome and wholesome article. Fruit-soup, as a diet for a fever-patient, is adapted to his needs, because it is easily ~~digested~~ and absorbed and contains the necessary nutriment, and there is no necessity for digestion, as it is already digested. This diet furnishes a large amount of water. It also furnishes a food that is tasty. When a patient has typhoid fever his tongue is coated thickly, and so it is hard to relish anything; but this food is tasty. So we find that fruit is one of the most palatable ~~and~~ wholesome of foods for this class of patients. It contains little or no albumen, and the fever patient has not power to digest albumen; he has not power to digest, but he has power to absorb. So fruit is a perfect nutrient.

In addition to these fevers we have "surgical fevers." Fruit is just as valuable in surgical fevers as it is in other fevers. In such fevers as follow the operation of the amputation of a leg, for instance, a fruit diet is just as valuable as it is in eruptive fevers.

A surgical fever is an infection of the stomach with germs; there is no difference between that and the inoculation of the stomach with fever-

~~germs. They are introduced into the stomach in a different way, but the~~

germs. They are introduced into the stomach in a different way, but the condition of the body is just the same thing. So we cannot draw such a line of distinction as is put down in the books in reference to the treatment of surgical fever and of a catarrhal fever or the treatment of an eruptive fever, for when you get the actual facts the condition of the body is the same; it is a condition of auto-intoxication, and the main principles of treatment are exactly the same with them all.

There are some other peculiar conditions which involve auto-intoxication: There is a condition known as infectious jaundice, in which the continuous use of a fruit diet is of the greatest possible value. In infectious jaundice we have what is known as gastritis, duodenitis chronic gastritis, a catarrh of the stomach and a catarrh of the duodenum--and each of them is a catarrhal or ~~infectious~~ ^{congested} condition extending through the bile-ducts into the liver; the bile-ducts become swollen so that the liver cannot empty itself, and so by degrees the bile-duct is largely obstructed and the patient has jaundice. This comes on with a chill and a pain in the region of the liver. In such a case there are some symptoms presented like those of gallstones, but the pain is not so sharply localized, the jaundice does not develop so suddenly and does not go away so quickly; perhaps it remains for weeks,--~~and xxxixgaxaxaxix~~
~~xxxx~~ In case of gallstones a stone may slip through the duct, and ^{gallstones} the jaundice will go away quickly. But a person requiring ^{gallstones} a diet for ^{gallstones} requires the same diet for jaundice. You will find that you can group together large numbers of maladies in treatment, instead of having a specific treatment for this, that, and the other disease.--

DR. PAULSON: It is like having one Gospel for all sins .

DR. KELLOGG: Yes. These therapeutics are simple, when we

understand the principle. You see, fruit diet is almost a panacea.--

DR. PAULSON: It is like the Gospel in this respect: Although the Gospel is intended for the cure of all sins, yet it will not cure us if we don't understand its spiritual therapeutics. So a fruit diet will not cure us of our physical sins, unless we understand its principles.

DR. KELLOGG: That is true. Chronic catarrh of the stomach and intestines in jaundice is really a frequently recurring trouble and an acute infection, so far as the liver is concerned, and a fruit diet is valuable in such cases. Why? Because in infectious jaundice the liver is crippled. We depend upon the liver, as an antiseptic organ, to destroy the poisons produced in the body. Now, if a fruit diet will limit the quantity of poisons produced in the alimentary canal we can readily see that it will be a great aid to the liver when it is burdened by the damming up of its channels by the retention of bile so that its functions are seriously interfered with,--in that case we can see that fruit diet is valuable, because it would cut off almost altogether all the ptomaines ordinarily produced in the alimentary canal. So this principle will apply to all cases in which the liver is crippled. Now, passing to chronic disorders-- do any of you think of any more acute diseases?

DR. PAULSON: Eruptive disorders are specific poisons.

DR. KELLOGG: Yes,--for instance, scarlet fever--in which creatin and creatinin are always found--would you consider that a waste substance, or a food-substance which has not been fully utilized,² Experiments have lately been made going to show that they are poisons; that they are not utilized in the body but are eliminated. I think, however that their toxic effects are very slight. The natural products of the body ought not to be extremely toxic, because the body ought not to

destroy itself. Uric acid and urea are produced in large quantities, but they are not very poisonous, I think. I think the chief property of urea is that of a diuretic; it stimulates the kidneys to the elimination of other poisons; that is one of its chief uses; it is a normal diuretic, and the kidney recognizes it as such, and it does not injure the kidney. This is an ~~illustration~~ instance of the beautiful arrangements of nature in the human system. Urea is so useful that it has been used as a remedy for uraemic conditions,--and that demonstrates very clearly that urea is not a poison of uraemia. But Gautier has shown that creatin and creatinin are precursors of scarlet fever; that they are formed under the influence of the particular germs of this disease--that they are the contagium vivum of scarlet fever. (9) He has shown that under the influence of these germs in the body an extremely toxic substance is ~~formed~~ manufactured from creatin and creatinin,--that that is where this peculiar poison comes from; that the toxin of diphtheria and the toxin of scarlet fever are formed from creatin and creatinin.

Now you can readily see what would be the effect of ^{the use of} beef tea in these cases, and how absurd it would be to use soups of beef extracts or any of those substances which contain large quantities of creatin and creatinin, the very ~~substance~~ which is necessary ~~which is necessary~~ for the production of the specific poison of scarlet fever and diphtheria. It is quite likely that a further investigation of this subject ^{substances} will show that the specific poisons of disease are transformed toxins, that a wrong direction has been given to their development, so that in the chemical combinations taking place in the body under the influence of particular germs present in the body these deadly and characteristic poisons are produced. Now that being the case, how absurd it would be to give patients meats of any sort. I have often seen patients have a relapse

in fever from eating meat; I have seen them relapse in scarlet fever and in typhoid fever and almost die,--and some did die-- after eating a hearty meal of meat. Why? Because by this means there was a re-infection of the body, and the battle which the system had once fought successfully had to be fought over again.

Q. In long-drawn out eruptive fevers where the patient's strength is wasted and he has to have nourishment, would you continue to give him fruit?

A. A word or two first. The general opinion among physicians is that fruit should not be used in typhoid fever,--especially where there is a tendency to peritonitis, and where there is a tendency to distension of the bowels, in diarrhoeas and all kinds of intestinal disturbances. In all such cases you will find that the dietetic authorities say that fruit is contra-indicated,--that this is true in cases of intestinal irritation. Now I cannot understand where that theory originates,--unless it be in consequence of bad combinations of fruits with other things, as I have never seen any ill effect come from the use of fruit by itself in these cases, or from the use of fruit in any form--fruit-juices, for example. One can understand that if a patient should eat raw apples with their skins and cores there might be a disturbance and an irritation of the alimentary canal, or if one should eat seedy fruit there might be some disturbance,--but that has not been proven to be true in diarrhoea and dysentery. Granose has been used *with good results* for a long time a remedy for diarrhoea and dysentery. Blackberries is also a good remedy, the seeds being prohibited simply from a theoretical prejudice without evidence. I never prescribed an exclusive diet of fruit in typhoid fever. As soon as the tongue begins to get clear, some more nutritious food should be introduced,--it may be what Hippocrates calls "ptisan." This is

a sort of knock-down argument for some doctor or patients who objects to a fruit diet in these cases--that Hippocrates, three or four hundred years before Christ, prescribed ptisan for these cases. That is true,--and it has been prescribed for such patients ever since. This "ptisan" or thin barley gruel, strained through a cloth,--by long boiling, the starch is converted into amyloextrin, and then into erythroextrin. ^{when browned} Boiled flour is often given to babies,--flour-balls--the flour having been boiled eight or ten hours; by subjecting it to a high temperature we increase its digestibility, and this is better. In addition to a fruit diet we may give the patient a little granola or granose or flour that has been ^{boiled and} browned, or water-crackers that have been put in the oven and baked until brown, or zwieback or some other form of heat-digested starch.

Q. Do you supply such patients with nourishment by gluten ^{or milk} or fruit-juices?

A. Such patients are not allowed to suffer for want of this kind of food. Farinaceous foods furnish a sufficient amount of albumen; and if there is a little gruel put in with the fruit-juice, it is all right. The patient might eat a little granola with the fruit-juice, or he might eat a little crust or toast. It is surprising how little food a person eats when he is suffering from typhoid fever. When the patient has a loathesome, thickly coated tongue, swelling of bowels, tympanitis, etc., I am satisfied that this is largely due to a fluid diet. I don't recommend that diet; I am satisfied that it is a mistake. Doctors give it because it is a fluid food and better than beef-tea,--and there is no doubt about that it is--

Q. How would kumyss be?

A. It would be better than milk, because the acid of kumyss is antiseptic. If you give such patients milk at all, give them sour milk or buttermilk,--give them this, or kumyss or cottage cheese--all these things are better than ordinary milk--raw milk or any of the ordinary forms of milk which swarm with the bacillus coli, of which the patient has too many already. Milk is certainly an objectionable article of food in these cases.

Q. How about malted ~~milk~~ *milk? nuts?*

A. It is better than ordinary milk,--it does not form curds. It is mostly gruel.

Q. I was recently called to see a case of inflammatory rheumatism; the patient had been ill for several weeks, and was weak, and I recommended a fruit diet for her. Could you keep up such a diet for her for two or three weeks after she had been poorly nourished so long?

A. Not exclusively,--but I am going to take that up.

Q. Will sweet buttermilk form curds?

A. No. To-morrow morning we will take up the question of Fruit-Diet in Chronic Conditions. Then we will consider the question of Fruit-Cure.

Dr. C. E. Stewart
Sanitarium

Lecture to
Medical Students
May 4, 1898

of blood-clots.

Blood-clots in chronic conditions. When we still consider the digestion

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B. I am recommending to see a case of indigestion which

is in the blood.

A. It is better than ordinary milk -- it does not form clots.

B. Now would you better understand

good in these cases.

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A. It would be better than milk because the fact is that the blood clots are

Deep

LECTURE TO MEDICAL STUDENTS, APR. 29-93.

Digestibility!
Fruits,--Their Uses, etc.

J.M.Kellogg, M. D.

--- X ---

I am glad to see you back from the "war" in which you have been engaged. I hope none of you are wounded, and that you have come back stronger than you were when you went out. I hear you have had an interesting time. I am sure you found it your best work,--to give out something. It is more blessed to give than to receive,--especially in matters of knowledge; when a person has loving, saving truth, it is pleasant to give out some of it to others for their benefit.

We were last talking about the uses of fruits, especially as a source of water in a tropical country where water is scarce. We noticed the value of fruits as nutriment. We also noticed that they contain sugar, a little dextrin, acids, a small amount of albumen, but no fats; that the special characteristic of fruit is water, next, sugar; next, acids. We noticed that one curious fruit, the olive contains fat, while in the case of bread-fruit, which grows in tropical countries, we have a large amount of starch.--

Q. The banana has starch?

A. Yes, but we were studying the uses of fruit.--By the way, let me say that you can make your class-work profitable by concentrating your attention upon the subject. "Some of you may say, "I will put this down and study it up from my notes hereafter." But it is better to put it down in your brains so thoroughly, at first, that you can never forget it. Once telling is enough, if you only see it hard enough. So, when you hear or read a thing, if you only do so with intensity enough you will never forget it,--for instance, if you should read in the papers this

morning that the U.S. navy had just bombarded Marro Castle and destroyed it, you would never forget it. Now if we let our whole souls enter into what we are doing with the same powerful intensity in everything that we do, we shall not have to go back and review things all the time, instead of progressing all the time.

Another valuable use of fruit is, as a peptogen. It stimulates the stomach and salivary glands to secrete their respective juices in abundance. As a peptogen for the salivary glands it stimulates them to the production of saliva for the purpose of salivary digestion. It is a peptogen for the stomach because it stimulates the stomach to produce an abundance of gastric juice for digestion in the stomach. There are various kinds of peptogens. ~~Many~~ Acids are peptogens. Sweet substances are peptogens. These peptogens are natural substances. Some years ago I found by experiments with pepper, mustard and other flavors, that there was no evidence for believing that they were peptogens; that they did not at all increase the amount of saliva secreted by their use.---I ought to remark that the most vigorous effects upon the salivary glands by food is produced by its dryness; dryness of food does stimulate the salivary glands to the highest degree to which it is possible for them to be stimulated; it need not necessarily be hard, but dry. The addition of pepper, pepper-sauce etc. has no effect whatever.. We increase salivary secretion when we add granose. When such substances are added to the liquid substances they do to some degree stimulate the salivary glands; they stimulate all the excretory organs of the mouth to pour out the fluid to wash away these irritating substances. Acids and sugars are peptogens because they stimulate the action of the saliva. The flavors of fruits are peptogens. (Flavor includes both odors and taste.)

When the nose is closed there is no sense of smell. So it is important to preserve the sense of smell, not only as a means of protection from unsanitary conditions, but also as a means of aiding in the digestion of food, because the stimulation of the sense of smell has the effect to stimulate the salivary glands. Sometimes it works the other way. I remember the case of a young man who was once suffering from a chronic nasal trouble: Whenever he sat down at the table and began to chew his food, the serous fluid began to run from his nose almost in a stream so that he was obliged to constantly use a handkerchief while eating. This is an illustration of the physiological sympathy between the salivary glands and the serous glands of the nose. The senses of taste and smell are associated in the same way, and the glands of the mouth and of the stomach are associated in the same way. Sweets stimulate the glands of the stomach. Dextrin is one of the most powerful of all peptogens. See what a beautiful arrangement this is: Nature has provided us with saliva to act upon the starch,--and what is it first converted into? ("Amylodextrin.") What next? ("Erythro-dextrin.") What next? ("Achroo-dextrin.") What is the last? ("Maltose.") See what a beautiful arrangement this is,--the saliva converts the starch into dextrin, and the dextrin, entering into the stomach, stimulates it to make gastric juice, so that the secretion of gastric juice begins as soon as the fruit enters the stomach, and if you eat fruit with starch foods the dextrin is already in the stomach when the fruit gets there, so it does not require salivary digestion.

Another effect of the use of fruits as a peptogen:--When should we begin to eat fruit? ("At the beginning of a meal.") It is a good time to introduce the fruit at the beginning of the meal. What is the usual custom in eating fruit? ("It is the last thing at dinner and the first

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and the first thing for breakfast.") Yes,--and no fruit for supper; that is the usual plan, and it seems absurd. There is an adage abroad in the world,--"Fruit is golden in the morning, silver at noon, and lead at night." This is not true; it is the concomitants,--pie, cakes, etc., which are taken at night that are damaging. The majority of people take the most indigestible things for supper. They speak of such a supper as "light," but it is heavy because of its indigestibility. Sometimes the supper consists of cheese, pickles, and bread and butter,--many think the bread and butter is "light," but it is not; it is difficult of digestion, requiring several hours for digestion. Bread requires a longer time to digest than fruit.--We have considered the digestibility of fruit, have we not? ("We have not.") Then we will take it up.

Fruits are the most digestible of all fruits. The ripe sweet apple digests in an hour to an hour and a half. The ripe sour apple digests in an hour and a half to two hours,--that is, stomach digestion. In order that fruit shall digest rapidly, however, it must be ripe; it must not be hard and brittle and green; it must be soft and ripe, thoroughly matured; apples must also be thoroughly masticated. Let me repeat: An apple that is tough, green, withered, shriveled and hard, fruit in that form is very hard to digest. The digestibility of fruit depends upon its condition. Some fruits are more digestible than others. About this time of year, russets are hard and tough, and in that condition fruit is rather hard of digestion. The "snow-apple" is one of the most digestible of fruits. Unfortunately such fruits as we can easily digest are poor keepers, and for the reason that they have a very thin skin. An apple that has a tough skin is a good keeper, but it is like

to have a tough flesh, so this fact should be taken into consideration in prescribing fruit. Ninety out of a hundred patients can take apples when they are stewed or baked. Apples that are hard and firm should be cooked. They should be taken, for instance, in the form of baked apples or stewed apples.

There are other fruits that are hard to digest for the same reason,--for example the cherry is tough; it has a tough skin, and is notoriously hard to digest when taken with other substances, but when taken by itself it is protected by its own juices. When taken with other substances they cause fermentation to take place. The boy, for instance, who eats a pint of cherries, and then takes the ordinary quantity of milk, potatoes, and all sorts of things--meats, etc--will introduce into his stomach a splendid culture-medium for the growth of germs, and the acids of the juices will not be present in sufficient quantity to inhibit the growth of germs. Thousands of people cannot take fruit for this reason,--**simply** because if they take foods difficult of digestion with fruits they introduce the best possible conditions for producing fermentation, decomposition and indigestion.

There are other fruits which are hard to digest,--the pear, for instance, contains hard chunks which render the fruit difficult of digestion for a person that has poor digestion. Pears generally contain a firmer flesh than apples, so they are somewhat harder of digestion. But a soft, mealy pear is as easy of digestion as any other fruit, if you leave out these chunks or pits.

Perhaps the most digestible of all fruits is the strawberry. The strawberry is one of the best of all fruits if thoroughly ripe, but we should remember that the ripe strawberry picked from the vines is a very different thing from those that have come hundreds of miles, picked w

Half-grown, standing round for days, perhaps, in the market, and full of germs--swarming with microbes of every description until the fruit has become stale and moldy. When a basket of strawberries is in such a condition that one picks a handful off the top and throws them away because they are moldy, the whole basket of strawberries is unfit to eat, those that are left in the basket as well as those that are thrown away are thoroughly infected with germs, and it is absurd to throw one pile away and put the other pile into your stomach. When there is a mold or growth of germs covering the entire mass of berries on the surface of a basket of strawberries it is infected all through, and you will find it so if you examine the rest of the berries with the microscope. That is the reason some strawberries don't keep as well as other strawberries with the same care. I saw some strawberries that a lady had picked and put in cans; she poured some boiling water on them and pumped the air out; those berries were in perfect condition. But that was a peculiar case. The lady thought she could do that every time, and a company was formed and a patent taken out. But the fruit didn't keep and the company went to pieces, as I expected it would. Strawberries when taken from the market should be boiled a long time before canning. I have known strawberries to be taken from a can completely spoiled because the germs had not been killed by the process of canning.

One of the most digestible of fruits is the peach. There is only six or seven per cent. of nutriment in the peach, but it contains acids and sugars which are valuable, rendering the peach a highly valuable means of disinfecting the stomach and alimentary canal. The same is true of the alimentary canal strawberries.

The grape is another very easily digestible fruit. If taken in large quantities they should be taken without the seeds and skins. The California grape, however, has a firmer flesh than has those of this part of the country, and one would not mind swallowing the seeds and skins..

The grape, the apple, the watermelon, the olive and the apricot are easily digestible, and I think they come next in order, while the peach, the cherry, the plum and gooseberries and other fruits of this class are more difficult of digestion. In tropical countries we have a large number of very easily digestible fruits,--as I showed you the other day;--the "sapote" is so pulpy that its flesh can be put in a glass and stirred up in cold water just as you would stir up a beaten egg or milk and cream with water; it is perfectly miscible with water, and, of course, is very easily diffused through the digestive fluids.

We must remember that fresh fruit is always more easily digestible than dry fruit. Dry fruit is improved by cooking. Dry fruit must be soaked over night; it must be soaked until it is thoroughly swelled, and then it must be well boiled. We must remember that in cooking fruits we destroy something that is present in the live fruit. Now if we should take a live apple and a baked apple--a raw apple and a baked apple-- and place the ~~two~~ two side by side, which would first become moldy? ("The baked apple.") . In two or three days the baked apple would be moldy if kept in a moist place. But we don't find mold growing on live apples. The same thing is true of the potato. Now suppose we crush or bruise the live apple,--it would soon become moldy, but it wouldn't mold so soon as the baked apple would., because it has

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A. It is simply a question of disintegration. Some people say they can't eat raw apples because they can't chew them, so they scrape them and eat them in that way instead of eating them by chewing. For such persons this is a wonderful improvement to the apple because it is then reduced to a fine pulp and is in just the same condition as when cooked, so far as disintegration is concerned. If it is neither cooked nor scraped the patient swallows it in chunks perhaps as big as Lima beans. The apple has a woody structure which holds it in shape, and when taken into the stomach in this condition--in chunks-- the gastric juice has no power to reduce this woody structure,--neither has the saliva; we cannot digest wood, and the consequence is that the apple retains its massy shape in the stomach and there is no digestion of it, and it ferments. The process of cooking softens and disintegrates the woody portion of the apple thoroughly so that the cooked apple becomes a pulp and in this condition enters the stomach, while the raw apple when taken into the stomach remains there a long time because of the failure of the gastric juice to disintegrate it; so the fruit must be completely disintegrated before entering the stomach, and if this is done the digestion of raw fruit will be as easy as that of cooked fruit. Let the patient scrape his apple with a knife before he eats it, and then note the results--

Q. Are not some of the flavors driven off by cooking?

A. Certainly there are. You lose some of the flavor by cooking, and not only that, you lose, to some degree, the sweetness of the fruit. There is a ferment present which inverts glucose and converts it into levulose; acids do not do this, but fruits have a more distinctly acid flavor when cooked than before.--

DR. PAULSON: I have sometimes thought that cooking set the acids free .

DR. KILLOUGH: I don't think any chemical change takes place in cooking, but, if you add cane sugar to fruit to sweeten it, it is better to do so after it is cooked, for the reason that the acid will invert the cane sugar to some degree--it will convert it into glucose and that greatly diminishes its sweetening power, so ~~it~~ ^{requires} only about half as much sugar to sweeten the fruit after it is cooked than it does to sweeten it before it is cooked. So fruit when cooked for canning should have the sugar put into the cans with the fruit, and then it requires less sugar than it would if the sugar were added before the fruit is cooked. But when fruit is cooked without sugar it must be boiled a longer time, as the fruit is exposed to more germs until after the boiling point is raised --

Q. What do you think of rhubarb?

A. That is not a fruit; it is a vegetable. It is used in place of fruit, but it is absolutely unwholesome and unfit to eat for the reason that it has no food value; it is simply a stem which carries nutritive value up to its leaves. And the acid of the rhubarb is oxalic acid, and oxalic acid is a deadly poison. Rhubarb has no nutritive value whatever. Some years ago I made an experiment with pie-plant when it was largely used in spring-time,--I made a careful examination of the urine of thirty persons who had not eaten rhubarb and found but a very small amount of oxalic acid present. Then I had rhubarb served, and had them all eat it and I found oxalic acid and oxalates in large quantities in every one of these cases. Now oxalic acids and oxalates are a damage and an injury to the body, and they are a pathological indication. Then there must be some toxic properties derived from rhubarb which it might be worth while to consider. So we banished rhubarb from our tables then, and haven't had any more. Pie-plant and other foods containing the same acids as pie-plant are to be avoided. I believe that the tomato

contains a very small amount of oxalic acid, and the onion also contains a little.

Now, to return to our subject: We were speaking of the digestibility of fruit, and the difference between the raw apple and the cooked apple in this respect, --and I think we were convinced that the raw apple had an advantage over a cooked apple, first, because it contains whic are capable of inhibiting the growth of germs; and, second, because it is better able to resist the effects of germs, --not only from the fact that it is acid, but also from the fact that it is alive--and it is a beautiful fact that we can convert live food into live tissues without causing the agonies of death. That is the original plan,--the Divine plan--that we should take living food just as it came from the hands of God and eat it, when it is at once transformed into our own tissues. So cooking is not altogether a good thing. But, because of our wrong habits, cooking has become general when we are in health, but when we are sick we return to nature and are then in the way of getting well, and we find that the greatest advantage to be derived from any sort of dietetic prescription is to be gained by the use of fresh, raw fruits.

Q. I am not sure whether we determined that fruit is less acid after cooking.

A. I don't think we will find any real difference,--the question was, whether acids acted upon the sugar and rendered it less sweet. I think the sugars in fruits are inverted. Green fruits must always be cooked, for the reason that the flesh is hard and firm, and cooking will do for them what the process of ripening would do for them. Green fruit contains starch while ripe fruits do not. By the process of cooking green fruit the starch will be converted into dextrin, and so the fruit will be prepared for the digestive process because it contains much less wood. Green fruit, if eaten in its raw state, is almost

entirely indigestible. Nothing is more likely to produce a serious attack of indigestion than eating green apples, as is common with children. Many a child has lost his life by eating green fruit that has dropped off the tree.

Q. Some fruits, as the prune, have nearly all the acid in the skin, and they are extremely sour if you eat the skins. When peeled, they are almost sweet.

A. The constituents of nearly all fruits are concentrated near the skin,--just beneath the skin. The most valuable nutrient material in the wood of a tree is just beneath the bark. The sweetest part of the potato is just beneath the skin. After baking a potato, if you remove a thick portion of the skin you lose the sweetest part of the potato. And so with the apple,--if you peel it very thick you lose the most concentrated flavor of the apple. And this seems to be true of the plum; the plum contains some acid which is concentrated beneath the skin.

DR. PAULSON: The tree begins to die at the center and not at the outside,--so the most vitality must be at the outside.

DR. KELLOGG: Yes; but this is not a question of vitality, but of concentration. This is a subject worthy of experimenting upon,--as to whether there is more albumen in the portion just beneath the skin. We should be always exploring some new field, and not be always repeating what some one else has said. Everything is useful that has God in it, hence these fruits afford a useful field for exploration. investigation. This is a subject which scientific men are not much interested in; they are interested in finding some new poisons, etc. But really the things which are of the greatest value are the things which have direct relation to everyday life,--and that is the most interesting field of study.

DR. PAULSON: Some physicians are most happy when they find rare cases of disease.

DR. KELLOGG: Yes, it is considered a great thing with physicians when to find a new disease or a new symptom; but I should consider it a much greater honor to find a new food.

Q. One lady said once that the Lord didn't intend that we should eat fruits for food, because he didn't furnish them all the year round.

A. He does furnish them all the year round; fruits are growing all the year round. People who live away up north where fruits do not grow should move south. Such a country is not a natural one. Tropical countries are the natural countries for man. Fruits and nuts grow all the year round in tropical countries,--that is, such fruits and nuts as are adapted to the human stomach, hence such climates are man's natural climate. This country is not a natural climate. We are only able to live in this country at great expense,--building expensive houses ~~xxxx~~ and wearing expensive clothing and the skins of animals to keep us warm, and if it were not for these arts that we have acquired by our forced and artificial conditions we could not live in this country. But you go into Mexico,--into the city of Cordova, for instance--and into other tropical countries, and you find that people live there with very little expense or labor worth speaking of. The coconut tree produces fruit in abundance, and banana plants and fruits of all sorts grow in abundance. A man can go into the forest and find all that he wants without cultivating anything. And for clothes, the native wears a skull garment about him--just for modesty's sake--

Q. Would it not be well to cook bananas?

A. The banana is greatly improved by cooking. In tropical countries the banana is sometimes cooked, and the plantain is always

always cooked; it is much harder than the banana, and it is taken green and cooked. Bananas, to be nice when baked, need to be taken green; they are then a little more acid, - not quite so sweet. In tropical countries where the banana is dried and converted into flour, it is quite well ripened and becomes exceedingly sweet, closely resembling such fruits as figs. Next time I will talk to you about the Therapeutic Uses of Fruits.

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LECTURE TO MEDICAL STUDENTS, May 5, 1898.

Fruits-- Diet in Disease .

J.H.Kellogg, M. D.

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LET us consider some of the conditions which involve auto-intoxication and which are amenable to a fruit dietary. The first of these conditions which I will mention is neurasthenia, which is perhaps a more common malady than any other among civilized human beings. This condition has not been observed as being prevalent among savages. It is one of those conditions which human beings and the lower animals do not have in common. Lower animals have many diseases in common with human beings,--horses, for instance, have septicaemia or blood-poisoning. Cows suffer from small-pox, and so on. Some animals suffer from typhoid fever by inoculation. Tuberculosis is common to all animals. But neurasthenia seems to be found among human beings only. The reason for this is perhaps the fact that human beings have wandered farther away from their normal condition as regards diet than any other class of animals. We don't find any class of animals ^{so sophisticated} in regard to their habits of life as is the human family. Neurasthenia seems to be a disease peculiar to civilization,--a disease which appears in people whose normal appetites and instincts have been nearly obliterated. It is a curious fact that the more civilized the people the more nearly completely obliterated are their instincts,--and this obliteration of instincts, is an evidence of physical decay and deterioration and of approaching race extinction. This recurrence of neurasthenia among human beings is a bad symptom; it is an evidence that the race is going down.

Now neurasthenia has been shown by Bouchard to be related to dilatation of the stomach and prolapse of the stomach. Glenard was the first

to show that the condition commonly known as "nervous dyspepsia" is due to prolapse or dilatation of the stomach. Bouchard showed the reason for this,--viz., that in prolapse of the stomach or dilatation of the stomach the food is not digested, is retained for too long a time in the stomach and undergoes fermentation and decomposition, ~~setting free~~ ^{producing} poisons which are absorbed into the system, and this results in a great number of various nervous symptoms called "neurasthenia." Neurasthenia then is not a disease; it is only a group of symptoms. It is important to get that fact well in mind,--that neurasthenia is not a malady. You will often find it referred to by medical writers,--French writers, especially--as a malady. Dr. George M. Beard, of New York City, one of the first scientific electricians and medical men in this country, and an eminent neurologist, wrote a book on Neurasthenia. The first use of the word "neurasthenia" was made by Dr. Beard about twenty years ago. He invented this term, and he showed that we may have neurasthenia of the brain, of the spinal chord, etc., and general neurasthenia, as well as local, and he developed a great variety of neurasthenias,--according to the particular centering of the symptoms, as one might say.

Now the study of neurasthenia shows that it is simply a condition of chronic auto-intoxication. Neurasthenia means simply loss of nerve-power; it means weakness of nerves. The word "neurasthenia" comes from two Greek words which, when translated into English, mean "nerves without power." Now a nerve is always without power when it is in a state of fatigue of the nerves or of the muscles,--whether a person becomes weary muscularly or nervously,--from over-work or from accumulation of tissue-poisons in the body--it being simply a state of poison or auto-intoxication. Sleep and rest will always cure fatigue; it is a

sovereign remedy for fatigue. If a person's muscles and nerves become fatigued, rest and sleep will cure that condition. If one's brain becomes weary from study, rest and sleep will cure it. But chronic neurasthenia is a fatigue that is not cured by sleep and rest. That is the only difference between neurasthenia and other kinds of nervous exhaustion. A lady once told me that she had nervous prostration,--she asked me if I didn't think she had nervous prostration. I told her I thought she had. Said she, "I think it is a terrible disease; I have heard of persons dying with it,--do you think you can cure it?" "Yes," I said, "I think I can cure it; I have it myself occasionally; I had an attack of it last night,--I woke up about three or four o'clock in the morning and had a terrible attack of nervous prostration." "Did you, indeed?" she asked. "Yes," I said,--"I have it quite often; but then, after I have had four or five hours sleep I am entirely cured."

Now the difference between chronic neurasthenia and nervous prostration, as it is termed--or the nervous prostration that any one has when he is tired--is simply the difference in the origin of the poisons producing these conditions. One of these conditions is a physiological condition, and the other condition is a pathological one. Nervous prostration is caused by work which produces the poisons present, and rest cures this condition. But in nerve-weakness or neurasthenia the poisons are being daily generated in the body as the result of pathological conditions,--not by normal work but poisons resulting from decompositions which are constantly taking place in the stomach and intestines, and the result is that the patient is not easily cured of neurasthenia. In order to cure this condition the doctor often gives the patient strychnia or some similar drug, but that only aggravates the symptoms and increases them. But the patient feels as well as he ever did; he feels

like an overworked horse after he has had a dose of strychnia. You will see these overworked horses in Chicago,--when one of them has had a dose of strychnia, his eyes sparkle and his coat shines, and he kicks up his heels, and prances off, travelling fifty miles to-day,--and to-morrow he is dead,--or, if he is not used so hardly as that, he travels perhaps five or ten miles to-day, three or four to-morrow, and the next day he can't travel at all; he is nothing but a bag of bones. This is what strychnia does. I understand that horse-jockeys give strychnia to their horses.--

A. STUDENT: I have seen a number of cases of this kind. I have seen two horses die in two days after the jockey gave them strychnia.

DR. KELLOGG: You knew that the jockey gave the horses strychnia did you?

STUDENT: Yes, sir.

DR. KELLOGG: It is a common thing for horse-jockeys to give their horses strychnia to cure their neurasthenia,--You could hardly call it neurasthenia because it is a case in which the horse is overworked, and if neurasthenia is nerve-weakness an overworked horse must have muscleasthenia. We find persons suffering from neurasthenia who are apparently strong. Such a man will say to his wife, "Wife, why can't I ~~not~~ do something? My muscles are strong, and when I am quiet I feel well, but as soon as I work a little I can do nothing more,--I am tired out." He is completely exhausted with a little work. I have known ^{such} people who were apparently well when lying on their backs. A lady once told me that for six months she lay on her back and was perfectly well and felt as if she could work as hard as ever she did in her life. In this case the lady could digest anything when lying on her

back; but when she was on her feet she could not digest anything. She was a lady who had been very enthusiastic on health-principles and kept going about her work. While she adhered to health-principles she managed to keep going, but she had great difficulty in digesting anything when up and at work. But when she would lie down and keep still she found that she could digest almost anything, so she thought that health-principles were of no account since she could eat bacon and all sorts of things,--she didn't understand it. Now to me this was a perfectly plain case: When she was on her feet her stomach fell down out of its normal position, and so her food was retained in the stomach and decayed there; but when she lay upon her back her stomach was in its normal place and the food passed on out of the stomach into the intestines; the stomach was able to do its work normally. I have met a number of people who say, "I am well when I am lying on my back, but as soon as I get on my feet I am always worthless. I met a man in Ann Arbor a year ago who said he felt a terrible pain in his side. I found that he had a prolapsed liver and that his stomach and bowels were prolapsed. As soon as he stands up these organs slip down. He finally put on an abdominal supporter, which holds the liver and stomach in place, and it gave him complete relief., and he felt as well as anybody as long as the abdominal supporter was in place. In this case there is something more than neurasthenia; there is this straining of the sympathetic nerve which is caused by the slipping down on the visceral organs. But, in a majority of cases neurasthenia is due to the absorption of poisons into the system as the result of decompositions taking place in the stomach and small intestines.

In neurasthenia, as I have said, a fruit diet is a sovereign remedy. Haig, an eminent physician and neurologist of England, who has

given much study to this subject, has shown that neurasthenia is a state of stomach intoxication. Bouchard, Dujardin-Beaumez, Trasteur and a great number of other European physicians have all taken a decided stand upon this question several years ago. Now there is no question with those who have made a careful scientific study of this subject, but that neurasthenia is almost universally based upon decompositions taking place in the alimentary canal. It is a fact that patients with neurasthenia almost always have a very badly coated tongue,--the tongue is found to be brown or yellow, the patient's teeth are coated and his breath is bad. And my observation is, that when the tongue becomes clean, neurasthenia disappears. I can't remember a single case where a person suffering from neurasthenia has had a clean tongue. And examination has shown of the stomach fluids has shown that in a great majority of these cases there is hypopepsia and infection present. Examinations show that in these cases there is a large amount of neutral chlorine present,--and this indicates poisons just the same as the presence of germs indicates poison; it means that there is fermentation taking place in the earliest stage of the digestive process and before the hydrochloric acid is formed so as to be present in sufficient quantity to render aseptic the alimentary canal, and so, poisons have been retained there, and so we find vegetable alkaloids ptomaines and ~~neutral chlorides~~ ^{neutral} chlorides present in large quantity, and these ~~neutral~~ ^{neutral} chlorides etc. are toxic substances. Whether they are produced by an abnormal chemical process or by bacteriological fermentation we don't know, but we do know that they are abnormal and act as toxic substances. But that is a subject that needs some further investigation. I have become satisfied, however, that these ~~neutral~~ ^{neutral} chlorides that we find by examination of the stomach fluids are toxic substances and have no normal value.---

DR. PAULSON: I think Mr. McDougal, of Salt Lake City is a case of this kind, and he recovered, and his tongue has been clear at all times.

DR. Kellogg: My recollection is that this was a case of hypopepsia with a large quantity of neutral chlorides,--is that your recollection, doctor?

DR. PAULSON: Yes, sir.

DR. KELLOGG: In a great majority of cases you will find in neurasthenic patients hypopepsia with infection of stomach fluid, the production of a great quantity of pepsin and a badly coated tongue.

I have dwelt somewhat at length upon the subject of neurasthenia because it is fundamental, in connection with functional disorders,--and the same thing applies to other functional disorders; it may be said, in fact, that a great majority of functional disorders find their origin in auto-intoxication,--for example, take neuritis: In neuritis we have a ^{general} toxic cause acting locally. The toxic cause is in the whole body, but there is in the body some point of low resistance,--for instance it may be a neuritis of the ulnar nerve, or it may be a neuritis of a nerve of the face, or it may be a general neuritis beginning--it always begins in the tips of the fingers,--it or remote portions of the body; it begins in the nerves which are farthest away from the center of nutrition, and where the resistance is the lowest, perhaps. Now we know that the nerves are nourished from their nuclei--from the ganglia in which they arise,--isn't that true, Dr. Paulson?

Dr. Paulson: Yes, sir.

Dr. Kellogg: The nerves of the trunk are, perhaps, nourished by the ganglia? ("Sensory nerves," etc.--different answers given.)

DR. KRILOFF : My idea is that they are nourished by the sympathetic ganglia,--that the nerves are nourished by these roots. We have ganglia all the way up to the spine having charge of the nutrition of the nerves which they send out, those which are farthest from the centers of control being likely to suffer first in nervous disorders. The same thing is true in such functional disorders as hysteria. Hysteria ^{usually} occurs in persons who have disordered digestion; in nine cases out of ten we find this to be the case. Hysteria has been very mistakenly looked upon as a purely nervous disease, arising, perhaps in the majority of cases, reflexly from ^{a disordered condition of} the ovaries. But investigations show that this cannot be true; at least in a large proportion of cases, for hysteria sometimes occurs in men as well as women. It also occurs in elderly women in whom the ovaries have undergone atrophy and have become senile. It sometimes occurs in children. One of the worst cases of hysteria that I ever saw was that of a girl of eight years of age. She had a spasm lasting twenty-four hours, in which the head and heels touched each other. This was a case of disordered digestion. I have seen hysteria cured very rapidly by the simple correction of a disordered state of the stomach. There is almost universally a coated tongue present in cases of hysteria.

We have another disease which is very closely allied to hysteria, viz., hypochondria; this disease is the analogue of hysteria,--hypochondria in men, and hysteria in women. Women have what is termed in common parlance, "nervous fits," and men have "the blues;" it is "hypochondria" in men, and "hysteria" in women, both arising from the same cause. I have never seen a case of hypochondria in which there was not a densely coated tongue accompanied with foul breath. We only have to go a step farther from hysteria and hypochondria to reach melancholia and insanity; this is simply one step in advance of hysteria and hypo-

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chondria, and it is found to arise from the same cause.

Now in a very careful study of the urine in cases of insanity, (for these cases have been carefully investigated) it has been shown that in insanity the primary toxicity is enormously increased. In insanity, it has been shown by examination of the urine by the method of urotoxic coefficients, that the urine contained a larger amount of toxins than in ordinary health. Sometimes very large quantities of toxins are found in the urine in such cases as acute mania,--an enormous quantity of poisons is sometimes found in the urine in these cases. It is found that in acute mania, and in nearly all the conditions of insanity, there is an increased amount of toxins present in the urine. Now in cases in which an increased amount of toxins is present in the urine a high ~~urin-~~^{uro}toxic coefficient is a bad symptom; it is a symptom which indicates that there ~~is~~^{is} being produced in the body too large a quantity of these poisons. In a case of pneumonia, ~~not~~ in which the patient has just passed the crisis, an increased amount of toxins in the urine would be a good symptom, showing an improved condition of the kidneys. In a case of typhoid fever, if the coefficient is above the normal, it is a good indication, showing a condition of renal sufficiency,--that the kidneys are doing their duty. In pneumonia it shows that the crisis is past, and that the poisons are being eliminated. But in insanity, or any other chronic condition an increased quantity of poisons in the urine is, as I have said, a bad symptom, showing that there is an increased quantity of poisons in the body. It is well to consider this point carefully,--the abnormal amount of toxins present in the urine in cases of insanity and lunacy. One eminent physician,--Van Swaden--used to cure insanity by a strawberry diet; he fed his patients fifteen to twenty quarts of strawberries a day. He made himself famous in this

way. And this has been talked about for the last hundred years as a medical curiosity.--that "Van Sweden cured insanity by strawberries." This must have been quite a contrast to the prison and the manacles and the generally barbarous treatment to which the insane were subjected in his time.

Another class of functional disorders which are amenable to fruit diet is skin-diseases.--

Q. Is chorea a functional disorder?

A. Yes.--and it is generally traced to the digestive tract. So sometimes the sympathetic nervous system is disturbed through some other cause, but, in a great majority of cases, chorea is due to disordered digestion. There is another chronic condition known as "night terrors," in children, in which fruit diet is useful. Some children suffer every night from a most terrible attack of what is known as "night terrors," a condition in which the nervous system of the child is deranged and disordered by this nightly affliction which can be traced at once to intoxication from decomposition of foods in the alimentary canal. Sometimes older persons suffer in the same way from nightmares.--although in nightmare there is an additional condition--that of the pressure of food upon the large vessels lying at the back of the stomach.--and possibly of the sympathetic--in that region.

chronic

There is another condition for which a fruit diet is beneficial, and that is a condition of toxæmia; it is a condition known as "nocturnal asthma." The patient awakes in the night unable to breathe; he sits up in bed and gasps for breath and thinks he is going to die, and he has a terrible feeling about the heart. This is because he cannot eliminate poisons as rapidly when asleep as when awake, and so the poisons accumulate in his body during sleep; the circulation slows down and the

kidneys do not do their work as rapidly and as efficiently as they should, and the poisons accumulate until the point is reached at which the respiratory centers are affected, and cease to act, and the patient springs up in bed with the sensation of dying. I have met a number of cases of this kind which have been cured very promptly by the discontinuance by the patient of tea and coffee, tobacco, alcohol, and especially of a meat diet and taking a plain, simple fruit-dietary,--a dietary of fruits combined with grains; grains combined with a fruit dietary will cure these cases almost immediately. There are other similar conditions which might be considered if we had the time.

Skin-disease is an acute condition which has its origin, in a great majority of patients, in the alimentary canal,--it is generated in the alimentary canal. Now I don't mean to say that the poisons generated in the alimentary canal produce skin eruptions, but they lower the bodily resistance so that parasitic microbes shall have power to grow in the skin and find a foothold there.. We know perfectly well that a live apple, or a live blade of grass or a live tree will not support parasitic growths or molds. We sometimes see molds and other parasitic plants growing upon live trees,--but those are not fungi,--they are not fungi in the parasitic sense--the proper sense.. But those molds which grow on a dead tree or on dead logs are parasites which you don't find growing on a live tree; you don't see such molds on live trees. When you cut grass and let it die you will very soon find mold on it, and it very soon becomes musty because it is dead. But fresh blades of grass or leaves on a tree are bright and clear, and there is no mold present, because molds and parasitic germs have not power to attack and destroy them while alive. ^{same} The thing is true of living animals; you don't find mold in the shape of eczema or psoriasis or herpes and various other

parasitic maladies; you don't find them growing upon the skin when the body is in a healthy state; but we do find them growing upon the skin when the body is in a state of low resistance so that it cannot prevent the growth of these germs, and it cannot destroy them.

Q. Is not the alcohol habit one of the primary causes of psoriasis?

A. It may be; but I have never seen a case of psoriasis in which the alcohol habit had been practiced.

Q. The cases of psoriasis that I have seen have been addicted to alcohol.

A. It is well known that in these cases alcohol must be prohibited, as also tea and coffee, --all these things are prohibited in these cases by such men as Dr. Bulkley of New York. Neurologists prohibit substances which favor the generation of toxins in the body, and it has long been known that a meat diet is **exceedingly** detrimental in cases of eczema, and in skin-diseases generally. Dermatologists generally proscribe a meat-diet for skin-disease. A fruit diet has been considered a cure for skin-disease for two thousand years, --from Pliny down to the present time.

I might mention another form of functional disorder in which a fruit-diet is valuable, --chronic alcoholism. Chronic alcoholism is certainly very amenable to treatment by a fruit diet. It has been recognized for a long time by persons who have had the care of drunkards and the treatment of alcoholism that a fruit dietary is a wonderful advantage, and that a meat diet is a wonderful disadvantage in this condition, --and this is not a thing which has been observed by vegetarians alone. It is a matter which has been recognized by pathologists and physicians who

have given the subject of chronic disorders a careful study,--it has been recognized for the last dozen years or more--that in alcoholism a fruit-dietary is a great advantage, and so, for chronic alcoholics the grape-cure is often prescribed. Patients are also sometimes sent to the mountains to practice the fruit-cure.

Now in chronic conditions,--in conditions in which there is a chronic state of auto-intoxication, we many times have degenerations take place, and one of the most common of these is arterio-sclerosis which is the foundation of a large class of maladies. The most common of this class of diseases, and which is amenable to a fruit-diet, is premature old age. The majority of people who die do not die of old age; they die prematurely; they die as the result of a diseased condition of the arteries. An eminent French physiologist has made the remark that "A man is as old as his arteries." Now suppose you find a man's arteries hard,--he is an old man, no matter whether the number of his years is great or small, he is an old man; if his arteries are hard and brittle he is about ready to die, whether his age is forty-five or a hundred and forty-five--it is the same thing. Old Parr who died at the age of 146 years did not die of old age; he died of acute indigestion. He went to London, by invitation, to visit the King; he remained with the King two or three weeks, and during that time the King fed him so highly that he died of indigestion. He fed him on meat and he had been accustomed to a vegetarian diet. The King wanted to see him on account of his great age, so he invited him to come and visit him which he did, and the King entertained him for two or three weeks, and, as I have said, he fed him so high that he was taken with a fit of indigestion and died prematurely. Dr. Harvey, the discoverer of the system of the circulation of the blood observed that there was not a

single artery to be found in the body of Old Parr in which he could discover that arterio-sclerosis had taken place; there was no evidence of degeneration of any kind about him. So this man died prematurely, although he was almost 150 years old when he died; he doubtless had, at that time, vitality and vigor enough to live a hundred and fifty years more.. Really he was not very old, physiologically, although he was so ^{very} old in years. I often meet persons in my office at the age of fifty-two or fifty-three whose arteries are hard,--who begin to give evidences of the accumulation of lime in the walls of their arteries. When you find an artery feeling hard like whipcord under your fingers, that man is an old man. Now if that man would at once adopt a fruit dietary, if he would regularly follow a modified fruit regimen--he would certainly lengthen his days,--and I am not certain but what in arterio-sclerosis one may by this means improve the ~~condition~~ his organic conditions--we do see improvement in the way of organic changes in some cases by a proper diet, and I am not certain but what we might see improvement of the same kind in these cases by the adoption of a modified fruit-diet. The improvement that I have seen in cases that have adopted a correct regimen in cases of this sort leads me to believe that if the patient would follow a modified fruit regimen with sufficient care and thoroughness, there might be a wonderful improvement in cases of arterio-sclerosis.

A word further in reference to old age : A famous Italian bacteriologist says he has discovered the germ of old age. I don't think there is any particular germ which produces old age, but I think that old age is due to germs, in a great majority of cases,--in fact I am not sure but what it is always due to germs, because old age began about the

time when germs began. I think there is pretty good reason to believe that germs were introduced into the world about the time Adam fell. There was no use for germs before that. Germs are scavengers, and when there was no death there was no need for germs; they were introduced for the purpose of destroying dead things which were the results of sin, for, if there had been no sin there would have been no death, and if there were no death there would be no food for germs,--would there? ("No, sir.") If there were no dead bodies there would be no food for germs, and there would be no use for germs, and no occasion for them. Hence before there was any death, it is reasonable to believe that there were no germs, and there was no death before there was any sin, consequently I think we may conclude that germs are the result of sin. And sin was the cause of death. The Lord said to Adam, after he had sinned, "Dust thou art, and unto dust shalt thou return,--" and germs are the means by which man returns to dust. God did not arbitrarily say to man, "You must die,--" that is, he does not arbitrarily cut off man's life as an executioner would cut off his head,--but he puts good and evil conditions in the world, and man has an opportunity to choose, and he can choose, such a diet and course of life as will cultivate germs,--and if he does that, he cultivates death. On the other hand he may pursue such a course of life that he will be able to resist germs. ~~And~~ Adam and his successors, ~~in my opinion,~~ up to the time of the flood ~~lived in accordance with these rules~~ ~~the laws of health,~~ and ~~the~~ ~~they~~ lived nearly a thousand years. The tissues of the human race were then so resistant that it took a thousand years of the infection of germs before they could destroy the body. It used to be a great mystery to me why a man could not live on forever, if he lived properly,--I believe he could, if he would live hygienically, if it were not for germs. These

germs are constantly present in the alimentary canal, in the intestines and in the ~~skin~~ colon,--you can't find a mammal but what has germs in the colon. And these germs are all the time producing toxins in the body,--they are all the time being produced in the body. And there is a condition which reaches beyond germs in shortening man's life. It does not seem reasonable that God constructed the body in such a manner that the poisons ^{produced by} ~~of~~ the body ~~alone~~ should kill it. The poisons produced in a tree do not kill the tree, and why should the poisons produced in the body of an animal kill the animal? But what does kill it? It is not the poisons which are physiologically produced in the body, but the poisons which are the results of man's sinning which kill the body. The germs which are naturally taken into the body, and which were created because of the transgressions of the world,--these produce the poisons in the intestines. These poisons are being constantly absorbed into the blood and they exercise a disturbing influence upon the metabolism of the body, modifying all the tissue-processes in a variety of ways. One of these ways is in the degeneration of the bloodvessels; the fibers of the bloodvessels degenerate, and as they degenerate, a cicatricial contraction of the bloodvessels takes place, and this cicatricial contraction closes up the vessels and muscles and there is a gradual withering of the vessels, so that where there was ten small arteries there will be only two or three, and these become muscular and so small that blood-corpuscles cannot pass through them; they become less in number, until by-and-by we have but one. Slowly this withering and starvation of the vessels takes place. That is the reason why, in the old man, the muscles shrink, and the liver shrinks and the heart shrinks and the kidneys shrink, the lungs become smaller, the brain is smaller,--and the whole man is smaller; he is a little shorter; he is

not so tall as he was when a young man. The whole body is shriveled up by the process of starvation of the vessels of the body through the influence of germs which interfere with proliferation in the walls of the bloodvessels, and which produce destructive toxins.

Now this process of old age may be carried on in the body as a whole, or it may develop in some particular part of the body prematurely. For example, it may develop in the kidneys, and then you have renal insufficiency. It may begin in the liver, and then you have hepatic insufficiency; or it may localize in the spinal chord and we may have sclerosis; or it may finally result in organic change. I think it is a good thing to generalize, in medicine, as much as we can. I would like to have you make a general application of this idea of old age. It helps one to have some general principles. Now the old-age idea will strike through nearly all chronic diseases of the lungs, liver, and various other organs. Consumption is hardly a chronic disease; it is really a perpetually acute disease, although it is accompanied by chronic processes; but these processes are produced by another kind of poison,-- it is a parasitic disease. But take the diseases called "constitutional diseases"--take rheumatism for example: There we have an exact illustration of the process of old age--of premature old age. It attacks the joints in a majority of cases; but it may attack the nerves instead of the joints. Haig has shown that the same condition which is present in neurasthenia is also present in rheumatism; that it is the toxic or morbid influence of uric acid upon the system which produces not only neurasthenia but rheumatism, Bright's disease and gout. Linnaeus, the great botanist, suffered extremely from the gout, and he cured his gout by a fruit diet. You will find that the great majority of people who

have rheumatism are afraid of fruit: they think fruit-acid is injurious. They say, "Doesn't a person with rheumatism have too much acid already?" I have had that question asked me by many rheumatics. How does a fruit diet increase or decrease the acidity of the urine? ("It decreases it.") It produces an alkaline condition,--how why? Because the organic acids of fruit become alkaline carbonates in the system. A diet of vegetarian elements ^{becomes alkaline} in the system. The urine of a horse or cow is always alkaline, or very faintly acid. A fruit diet limits the production of acid uric acid and it goes off in the form of urine. So rheumatism and gout are diseases which may be put down as curable by a fruit-diet. It is not the acid-containing wine of England which produces gout; it is their meat diet which produces gout. Because, in Italy, three times as much wine is consumed as in England, and yet in England gout is prevalent, while in Italy gout is almost entirely unknown. It is the "roast-beef--" the meat-diet --of England and America which produces the rheumatism and the gout, rather than wine-drinking. Wine contains acid, and some doctors have supposed wine to be the cause of gout, whereas the real cause is the "English roast-beef."

We have another chronic nervous disorder which is very frequently met with nowadays, and with increasing frequency, and one which is the most difficult to treat; it is one which is not always curable, but it can always be ~~markedly~~ wonderfully relieved and helped by a fruit diet,--and that is epilepsy. I don't know of any disease which is more certainly amenable to a fruit diet than is epilepsy. There are cases of Jacksonian epilepsy ~~which are due to a tumor or a depressed skull upon~~ ^{of the} the brain or some other similar condition rendering an operation necessary, whereas syphilitic epilepsy--epilepsy arising from syphilitic

poisoning--but ^{not} in so-called Jacksonian epilepsy the attacks may be looked upon as due to toxins. Some years ago we had with us a young lady about nineteen years of age who was suffering from epilepsy. This young woman once in about two or three weeks would pass into what is known as "an epileptic state." She had had the ovaries removed when she was about seventeen. A Chicago gynecologist did the operation and collected the fee (about \$500). It seemed strange that this girl of seventeen should have the operation of removing the ovaries when there was nothing the matter with the ovaries. She was a fine, healthy looking girl, splendidly developed,--a fine, healthy looking girl; she had the ovaries removed and they were found to be perfectly healthy; she had never had any difficulty with them; she simply had epilepsy. I watched this case, and found that the patient, once in two or three weeks would pass into an epileptic state, and when in this condition the patient would have a violent epileptic paroxysm. She would wake up suddenly and go into one of these spasms. A loud noise would bring on an epileptic convulsion. The slamming of a door, or anything that would produce a sudden start would produce an epileptic convulsion, and these would be repeated every two or three minutes, and this would last for two or three days; it was a terrible case. I was determined to find out whether this condition might not be due to toxins, so the next time an epileptic state came on, I had specimens of the urine saved, and when the patient was just passing out of the epileptic state, the urine that was produced at that time was tested by the urotoxic methods and was found to have a urotoxic coefficient ^{between two and} ~~more than~~ three times the normal,--it was so astonishingly toxic that the coefficient of toxicity was between two and three times the normal. The physiological effects of the urine in

this case were something almost frightful to behold: On injecting a rabbit with one c.c. of this urine, and almost as soon as the injection was made the rabbit was seized with an epileptic paroxysm. I had two men to hold the rabbit; but when two or three c.c. of the urine had been injected, the two men couldn't hold the rabbit on the table, although they put all their weight and strength upon the rabbit, ~~and yet~~ the rabbit sprang up four or five inches from the table,--his muscles contracted like a steel-trap and it was impossible for these strong men to resist them. Finally the rabbit, from this state passed into one which was attended with stertorious breathing; he breathed with his mouth open and with a strong snoring sound of respiration which was so astonishingly human that it was almost appalling. Now in this case there was not the least bit of doubt but what the patient was suffering from auto-intoxication or toxæmia. These poisons were accumulated within the body, and when they began to be eliminated the patient began to be better. But the patient was ^{some} worse at times than at others,--this state would pass off, but the poisons were retained. "But," you may ask, "what was the cause of the paroxysm? Was there a sudden increase of these toxins?" Not necessarily, but there was a sudden failure of the system to eliminate them, from renal insufficiency or some other cause, so that the poisons were retained, and as a consequence of this retention these attacks occurred,--just as these nocturnal attacks of asthma occurred in consequence of the kidneys failing to eliminate the poisons during the slow-ed nutrition of sleep,--during the slowing-down of the heart's action and of the kidney's action, and of the whole vital process during sleep. I put this patient immediately upon a fruit and water diet; I gave her large enemas twice a day; I made her drink all the water she possibly could and then gave her a fruit dietary and put her upon a strict regi-

men, and the result was that these paroxysms ceased. And for a long time,--and until the patient began to digress dietetically, there was scarcely a return of these symptoms. I believe the patient might have got well, but she had an unfortunate accident and she was led to digress in diet,--she burned her face by falling upon a coil and her mother sent her home, so that after that I didn't have an opportunity to observe the case. But, in this case, there was such a prompt recovery, after the withdrawal of all the substances from her diet which could produce toxins in the body, and the free use of fruit water and a fruit-diet that I was confident that we had proof that the epilepsy in this case was due to toxins.

This observation is not new. French medical observers have found the same thing, viz., that in an epileptic state and in chronic epilepsy there is an undue production of toxins.

Now in reference to the direct bearing of a fruit-diet in these cases: I am glad to be able to say that in almost every single case of epilepsy you can wonderfully improve the patient's condition by the use of a fruit dietary. You will uniformly find these patients suffering from a coated tongue and a bad breath,--and the more bromine they have had in different forms, the worse their tongues will be, and the worse their condition is. So that the thing to be done with these patients is to stop the bromines and stop the ptomaines and toxins, and give a fruit dietary which will produce wonderfully beneficial effects.

Some years ago, Dr. ^{Mc} Ogan, then having charge of the Kalamazoo Insane Asylum, came here, and I called his attention to this fact,--I think I first called his attention to it on the occasion when I read a paper and we had a discussion of the rheumatic diathesis;--he read a paper on rheumatism and I was asked to discuss it. I then called his attention to the fact that it is not only the condition of uric acid

which is the great difficulty in rheumatism, but there is a large number of toxins and of salicylic acid which will produce this condition. When there is a "diathesis," as it is termed, that is not rheumatism, but it is general toxæmia. I then gave a little discourse upon the subject of diet, and found myself talking too long;--however, they were greatly interested; Dr. ^{Mc}gugan and others were interested, and he couldn't talk about anything else except this condition of toxæmia,--and nervous disease, especially. He went home and made experiments in connection with epilepsy and epileptics and counted their paroxysms in a certain number of weeks; he took them in mass and found how many they had all day for six weeks; then he put them on a fruit diet--a modified fruit diet and a vegetarian regimen, withholding all meat--and the result was, that at the end of a given period of time they had had only half as many paroxysms as they had had ^{before} in the same period of time. The doctor reported this at the Civic Philanthropic Convention held here last summer. This was an interesting experiment.

My observation has been that these paroxysms can be almost entirely controlled by a fruit diet. We have with us a lady who used to have epileptic paroxysms every few days when she came here. She has been with us eleven weeks on a fruit diet, and she has not had a single paroxysm since she came here.

DR. PAULSON: A lady's daughter had paroxysms, and about two days after taking fruit the attacks ceased, and she has not had an attack since.

DR. KELLOGG: Epilepsy might almost be looked upon as a condition of auto-intoxication,--with the exception of Jacksonian epilepsy, and cases where the tumor is in the brain and the irritation is there all the time. Then why don't such a patient have fits all the time?

It is because there is an increased *sensibility* ^{in ordinary epilepsy} at times, which brings the patient to the point of paroxysm, -- there is an increased sensibility and irritation, -- but it needs poisons to produce that particular kind of paroxysm. But there is more to be said upon this subject.

LECTURE TO MEDICAL STUDENTS, May 6, 1898.

Fruits--Their Relation to Diet, etc.

J.H.Kellogg, M. D.

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PERHAPS I ought to say another word or two in reference to fruit diet in Bright's disease . We have two forms of Bright's disease: We have one form in which this disease seems to be systematically progressive, and another form of the disease in which there seems to be relapses or exacerbations, in which the disease is simply a succession of attacks of acute inflammation of the kidneys,--a disease invading new territories of the kidneys. In all forms of Bright's disease, so-called, it is a disease of the kidneys with albuminous wastes, in which a fruit diet is beneficial. In these forms of the disease the kidneys are disabled, and it is important that elimination should be encouraged to the highest degree. In fruit diet we lessen the formation of ptomaines, and the small amount of albumen introduced into the body by a fruit diet will lessen the development of wastes and excrementitious substances, and thus the kidneys will be given as little to do and as easy a time as possible. In the acute form of the disease patients may well take a fruit diet in some form,--either an exclusive or a modified fruit-diet. In the acute form of this disease nothing could be more valuable than a fruit diet, as it aids in elimination and also lessens the formation of ptomaines in the alimentary canal.

A disease which is closely associated with Bright's disease, is chronic disease of the liver. I do not refer to what is called "torpid liver" when there is nothing the matter with the liver but which means a disordered stomach,--for when a person says "Doctor, my liver is

torpid; I want something to ~~sew~~ it up," the simple meaning of this is that the patient's stomach is in such a condition that it produces a large amount of ptomaines. This is equivalent to chronic biliousness. In this condition, of course the patient needs a fruit diet, which will give the liver less work to do, because the liver is now overworked. But there is a chronic form of disease of the liver which frequently accompanies disease of the kidneys; this is chronic inflammation of the liver which may assume any one of different varieties. How many different kinds of chronic inflammation of the liver have we?--Have you read the Pathology of the Liver? ("No, sir.") Well, considered from a physiological standpoint,--from an anatomical standpoint--how many kinds of inflammation of the liver have we? ("Two.") What are they? ("Parenchymatous and interstitial.") Parenchymatous inflammation, or inflammation of the cells of secretion, and interstitial inflammation or inflammation of the ^{connective} ~~interstitial~~ tissues. We may also have inflammation of the portal venous system, in which there will be abdominal dropsy. Then we may have inflammation of the lymphatics,--the hepatic passages of the liver, or an inflammation involving chiefly the bile ducts of the liver. It is important to remember that an inflammatory condition of the liver may confine itself to any one of these three systems of vessels,--for instance, it may confine itself to the arterial system of the liver. The characteristic symptoms of the disease will depend upon the seat of the particular form of inflammation.

Now in any of these forms of inflammation, the functions of the liver must be seriously interfered with. In some forms of inflammation of the liver it is enlarged--in what form is that, in a general way? ("Hypertrophied.") What structures will be involved with it? ("Interstitial.") There is an enormous increase of connective tissue. I

doubt whether this can be so--I can't understand how this condition can be accompanied by an increased metabolism,--that is, where any reliable constructive growth takes place in connection with the inflammation. A chronic inflammation is different from an acute inflammation; a chronic inflammation is another process altogether; I think we had better call chronic inflammation chronic congestion accompanied with certain changes, because that is what it is; ^{fully} it is a chronic congestion with an abnormal proliferation of the tissues. Now in chronic inflammation the functions of the liver-cells are interfered with so that hepatic sufficiency is diminished. Is there any way by which we may know whether the liver is able to do its work,--do we have a test for liver sufficiency or insufficiency? ("Urinary analysis.") How would we find out by that? ("By the quantity of urea.") That is one indication,--what is another? ("Toxicity.") What is another? ("Hepatic tenderness.") What is another? ("Specific gravity.") The specific gravity wouldn't amount to much,--what is another? ("The weight of the patient.") I don't know of any writer upon the subject, except Bouchard, that ever takes into account the weight of the patient. Where one patient weighs two hundred and another patient weighs ~~one hundred~~ and seventy-five, you would expect to find some difference in the amount of urea; you would expect to find three times as much in one as in the other. There is another thing which should be taken into consideration,--and what is that? ("The temperature.") We must consider, first, the patient in bed,--his state of quiet; then we must consider the amount of exercise which he takes; and then we should ascertain whether the patient is eating heartily, or whether he is fasting; and if he has been fasting, it is important to find out whether he has been fasting for some time or not. There is

still another thing which it is important to ascertain,--what is that ? ("Atmosphere.") What else? ("Fluid.") The state of the bowels,--as to whether the discharge is fluid or not. Suppose the patient's bowels are loose and the discharges are fluid,--and what else would be discharged? ("Poisons.") Liquid toxins; toxins would be removed,--a considerable amount of urea would be discharged with the bowels in this condition, and this must be taken into consideration in applying the test. So we see that the test ^{of urea} for renal sufficiency or insufficiency is quite a complicated one. We must ^{not} rest entirely upon urea in making our examination. If we find a very low coefficient for urea, it usually alarms us; but we must see what it means. I knew one case in which the patient was a little woman not weighing more than sixty pounds and very thin,--a little bag of bones, so to speak-- she was lying perfectly still in bed, and produced six grams of urea in a day. That was not an alarming fact in that case; but if it had been a patient weighing 250 pounds, and exercising, we should expect to find much more urea. Now suppose there is renal insufficiency: We would say we must feed the patient on a fruit diet,--in a case of renal insufficiency, with evidence of inflammation of the kidneys, we would put the patient on a fruit diet.

Now there is a test for hepatic sufficiency or insufficiency,--what is it ? ("Sugar.") How much sugar? ("One hundred grams for a patient.") The rule is one hundred grams, but I think the rule should be placed on a more scientific basis. I think we ought to say one hundred grams for every large patient; we ought not to expect that a little patient would dispose of as much sugar as a man twice as large. The only rule has been, one hundred grams of sugar to be given to a pa-

tient on a full stomach, and immediately afterwards let the patient fast. Then we can determine the ability of the liver to oxidize the waste substances of the body. This is associated with the storing up of glycogen in the liver. Can you tell me whether there has been found different kinds of working-cells in the kidneys? ("There has.") Do they have different functions? ("They do.") How many kinds of classes do we have? ("Two.") We have two general classes,--one of these classes of cells secretes one kind of poisons and does one kind of work, and the other class of cells does another kind of work and secretes another kind of poisons. How many different kinds of cells have we in the liver? ("One.") We see that the different functions of the liver are combined very closely,--the antiseptic power and the digestive power are associated. Now if a man has quite a large amount of glycogen stored up, does he have greater or less resisting power? ("Greater.") His power to destroy poisons--his antiseptic power-- depends upon his store of glycogen; I don't know as any one knows why that is, but we know it is true. So we find that in the case of a liver which is enlarged, if it is the subject of hepatic abscess, or if there is some particular inflammation, or an inflammation in a general way, or an inflammation that is confined to ~~the vessels~~ any of the vessels--for instance, the biliary vessels, or the lymphatic vessels--any form of inflammation of the liver which disturbs its functions will lessen its ability to do different kinds of work; consequently such a case will require a fruit dietary.

We find another reason for the use of a fruit dietary in fevers and in all forms of disease in which ptomaines are produced, in the fact that the sugar and the dextrin present in fruit are ready to be taken at once *in-* to the liver,--even though the digestive power of the alimentary canal

is lessened--still here is the sugar and the dextrin which may be at once absorbed and taken into the liver with the material necessary to support its germ-destroying properties.. The presence of glycogen in the liver aids it in the performance of its most important functions. So, if the patient has an enlarged liver, a cirrhotic liver, abdominal dropsy, liver-abscess, or any disturbance of the renal functions,--in all such cases fruit might be valuable,--of course, just now we leave diabetes out of consideration.

Two other conditions ^{which indicate a fruit diet} are chronic anaemia and chlorosis. These conditions have not, until recently been recognized as due to auto-intoxication, although as long ago as fifteen or twenty years there were those who pointed out the fact that chronic anaemia was consecutive to chronic inflammation of the bowels. Dr. Minot, of Dresden, Germany, who has written on the subject of pelvic diseases, has shown that chlorosis, a disease which was formerly supposed to be due to some disorders of the ovaries or of some special organs of sex in women, is really due to prolapse and dilatation of the colon, and that prolapse, enteroptosis, and dilatation of the stomach are conditions upon which chlorosis depends. Chlorosis is simply a state of auto-intoxication, and Dr. Minot's paper on this subject, published in Modern Medicine several years ago, is, I think, very conclusive in the evidence which it affords upon this subject. So I think, in anaemia and chlorosis we should be sure to give our patient an abundant fruit diet, for by this means we shall bring the alimentary canal into a healthy state and give the patient an opportunity for a more speedy recovery.

There is another condition of the system indicating a fruit diet,--and that is, cancer of the stomach. When I was at Grand Rapids recently, I mentioned in my paper that fruit diet was valuable in cancer

of the stomach in cases which we recognize as being ~~curable~~ incurable,--that we might still add to the patient's comfort by feeding him largely upon fruit. I also called attention to the evidence of Dr. Land (?), who, nearly a hundred years ago called attention to fruit dietary in these cases, ^{to} the fact that an absolutely non-flesh dietary and a large use of fruits was one of the most effective means of delaying the growth of cancer, and that in some of these cases, patients were cured. In my own experience I have seen very great benefit from the use of a fruit diet in cancer of the stomach,--especially when the pylorus is obstructed so that the food ^{could} ~~cannot~~ find its way out of the stomach; that the continued use of fruits would kill off the germs which were present in the stomach in great quantities in these cases. Some of these cases which are not recognized as cases of toxæmia--

DR. PAULSON: In cases where a cancer has been removed and by-and-by another cancer came in another part of the body it has been found that fruit is a good prophylactic because it delays the growth of the cancer.

DR. KELLOGG: Yes,--and if it does this, it is evident that the use of a fruit diet should be pursued after the cancer is removed, and then he has the benefit of a fruit diet if the disease is removed and he recovers.

DR. PAULSON: The question is, Why does this patient have a cancer in another place after the first cancer is removed?

A. The fact that he was attacked with cancer in the first place and that the disease developed, showed a loss of power to resist the cancer parasite. Suppose a person is cured of lupus and it breaks out in another place: This is because he has lost his power to resist germs.

of the skin. So with tubercular affections. In general, the patient loses his power to resist the disease, hence it breaks out in a new spot and he has a new infection,--it is not the old infection, it is a new one. The same is true of cancer, when it breaks out in a new place it is not the old infection--it is a new infection. So when a person with a tuberculous disease goes to Colorado or to some Rocky Mountain region, he can never return to the old climate again; they may be cured, but they can never with safety return to the old climate, because a change, a weakening has taken place in those persons from which, they can never recover,--they have never recovered, and probably never will recover their former condition; they have lost their power to resist the tubercle-germ. Such a person must regard himself as always susceptible to the same disease, and if it returns, it should be treated as before. Such a patient is everywhere susceptible to disease, and when it breaks out in a new place, it is because it has found a new focus of infection and must be removed as before.

DR. PAULSON: I remember of reading a number of statements in the testimonies showing that meat renders the stomach susceptible to parasites..

DR. KELLOGG: There is a practical illustration of this ~~fact~~ truth in the fact that cancer is more rare in India where the people avoid the use of meat, than it is in England where meat is largely used. In Cordova, where the native Mexicans live almost entirely upon fruit cancer is very rare. There are many places there where they scarcely ever taste of meat; they live mostly upon fruits. One man reported that he never saw a case of cancer in Mexico. In England, cancer is frequent and seems to be increasing in proportion to the amount of meat

eaten. There are many English physicians who have adopted the idea that pork is a cause of cancer--

Q. In a case where cancer breaks out in a new place, may it not be from the old infection or metastasis--

A. I think it would not be true metastasis; I don't know why we should not call it a new infection. I think it must be a new infection because it does not seem to be in direct communication with the first infection, because in that case we should expect to find infection extending all along the road from the first infection to the second, but we don't find it,--for instance, we find cancer in the axillary glands; this is removed and then we find it in the mammary glands,--there is no evidence that it is communicated from one to the other, but rather that it arises ^{directly} from the parasite of cancer in the mammary gland--

Q. Do the parasites live in the gland?

A. Yes,--in the internal but not in the external gland. There may be a weakness of resistance in that locality produced by irritation from some cause. Cancer of the lip begins with irritation of the pipe. Cancer of the tongue begins with irritation of the teeth. Cancer of the breast comes from an irritated or bruised breast--

DR. PAULSON: Cancer of the pylorus comes in the same way.

DR. Kellogg: Yes. But we know that cancer may begin where there is chronic inflammation. Cancer of the uterus begins with laceration of the uterus. Cancer cannot attack perfectly sound and healthy tissue. An investigation carried on some years ago by an English physician shows that it is possible to infect animals with cancer by maintaining a prolonged irritation of some sort--irritating some part of the body

for a long time, and thus that part loses its power of resistance to parasites to such a degree that cancer -cells are produced and made to grow; this was done in the case of a rabbit. Cancer does sometimes occur in lower animals,--and it occurs in the carnivora. Cancer is sometimes found in dogs.

I might call your attention to the fact that epilepsy is quite common among carnivorous animals, but it is almost unknown in the herbivorous animals,--it is scarcely known in herbivorous animals, but is frequently found in carnivorous animals,--the cat, for instance, has fits when fed on meat. Many people do not feed their cats on meat because they don't want them to have epilepsy. Babies fed on meat are very likely to have convulsions, and it is put down as a fact of common observation that children who eat a great deal of meat are subject to epilepsy. Some physicians are satisfied that epilepsy in young children is due ^{largely} to meat-eating.

We have not discussed the relation of a fruit diet to the different forms of dyspepsia, fruit diet in relation to diabetes, etc., fruit-diet itself--what is it, how should it be conducted, etc, but we will speak of these things at some other time.

LECTURE TO MEDICAL STUDENTS, May 9, 1898.

Fruits--Fruit-Cure in Obesity, &c.

J. H. Kellogg, M. D.

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IN the first place, this morning, we will speak of the Fruit-Cure in Obesity. There is probably no disease in which there have been so many different diets suggested as the cure of obesity. It has been generally recommended that persons suffering from obesity shall not take water nor fruits, on the supposition that the sugar of fruits is likely to encourage the production of fat; but we find that a fruit-cure for obesity is an excellent means of reducing flesh. A fruit-diet is semi-starvation,--it is the next thing to starvation if one takes the right kind of fruit. In the treatment of obesity, three things are necessary,--

1. Diminution of fat-making food,
2. Diminution of food of all kinds,
3. An increased amount of exercise, and increased mental work,--using up more material--increased oxidation. We want to increase all these things, so they may be considered as one,--although we can stimulate oxidation independent of exercise.

Oxidation may be stimulated by cold-bathing, and by breathing in cold air, by massage--by passive means--but voluntary exercise is one of the most efficient means for reducing flesh. We find that fruit will encourage two of these things: By means of a fruit dietary we may diminish the amount of solid substance that the patient is eating while not lessening the quantity of the food that he eats. Patients find it a

great hardship to leave the table when the stomach is only half full. There are patients who have been accustomed to eating until they feel a sense of satiety, and they cannot take any more because the stomach is so distended; I think that is the standard for many people. There is an old Scandinavian proverb,--"The ox knows when to go home from grazing, but the fool never knows his stomach's measure." The majority of people eat as much as they can eat,--they eat until they feel that they cannot eat any more. I mean by this, that the majority of people have not had their diet restricted. The physician having such a patient in charge tells him,--"You mustn't ^{eat} more than a quarter of what you want to eat." This submits him to a test of self-control that such patients, in a majority of cases cannot endure, and so he gets tired of his physician and leaves him. But, in fruit-cure, you may say to your patient, "You may eat any amount of fruit that you want." If the patient asks you what kind of fruit he shall eat, tell him he may eat any kind of fruit except very sweet fruit. You wouldn't say to him,--"You may eat all the raisins or figs or dates you please," because, in that case he would be taking too much sugar. It is possible to eat so much of this class of fruit as to produce a gain in flesh. But you would tell him, "You may eat all the apples and grapes you please,--perhaps you should not eat the California grape--eat Michigan grapes or that class of grapes. I have tried both the apple-cure and the grape-cure for obesity and it works beautifully. Patients enjoy that diet; they can eat all they want without doing them any harm, and at the same time reduce their flesh, because they are not taking food enough to maintain the demands of the body. So, by an increased amount of exercise

and the use of a fruit-diet, a patient suffering from obesity can always be reduced in flesh, and in the pleasantest manner possible. So I recommend a fruit diet as a cure for obesity. So much for the starvation part of it; now for the oxidation part of it.

Now what is the condition of the blood which favors oxidation?-- acidity or alkalinity? ("Alkalinity.") At what time is the blood most acid,--in the morning or in the evening? ("In the morning.") Yes When is the blood most alkaline,--before or after a meal? ("After a meal.") Then in the morning ~~before~~ breakfast would be likely to be the time when the blood would be most acid. That is the reason we say to a patient suffering from obesity, "Take a morning walk before breakfast," because the blood is more acid then. Such exercise will greatly aid in the reduction of flesh. Now what would be the tendency of the use of acid fruits? It would tend to alkalinity of the blood.") How does it do that? By actually introducing alkalis into the body? I don't think this point has been definitely settled. I know these fruits produce alkalinity of the urine. We propose to undertake a series of experiments upon this subject, and I have asked Dr. Stewart and Dr. George to take charge of the experiments. Dr. George will give you a lot of work in physiological chemistry right along this line. Dr. Stewart will have general charge of the work, and you will have an interesting line of experiments during the next few weeks, in which we want to settle some of these questions. From my own experience, the introduction of acids in the form of fruit into the body, will, I believe, encourage oxidations. But this means we ^{see the} patients' tissues clear up and the uric acid disappear. I remember many cases in which we found that uric acid will disappear in a fruit diet. Now I am not sure that the alka-

linity of the urine is due to alkalis derived from fruits.. I am more of the opinion that it is due to the fact that the acid of fruit stimulates oxidation and favors the metabolism by which complete oxidation takes place. The question is not thoroughly settled, but I am satisfied that the use of fruits encourages metabolism. I shall be glad if we can make such experiments as will settle this question. Dr. Haughey of Chacago insisted that fruit increases the acidity of the blood, and the physiological chemistries tell us that the acids of fruit are converted into alkalis in the blood. Now let us try and see if we can solve this difficulty,--at any rate I believe that the use of fruit favors the reduction of flesh--I know it does, by actual observation.

There is another disease in which a fruit diet is useful,--diabetes. This is a disease of disturbed nutrition, in which the characteristic feature is the diminished oxidation--

DR. PAULSON: I have a patient who has lost 48 pounds after eating granose and oranges for about eight weeks. At first he ate all the oranges and granose he wanted, but I think he now takes only one or two granose cakes at a meal, and about ten oranges a day. But he has gained in strength and improved in other ways, although he has lost in weight.

DR. KELLOGG...It is interesting to note the fact at least half of the sugar of fruit is levulose. Investigations have been made showing that levulose does not interfere in diabetes; it does not increase the amount of sugar eliminated by the kidneys as does glucose. A person suffering from diabetes can take levulose without ~~it~~^{sugar} appearing in the urine in an increased amount. Recent experiments show that the amount of levulose which can be taken is not more than two or three ounces a day; that is the full amount that can be taken without increasing the amount

of sugar in the urine, whereas a small amount of glucose has the effect of producing ^{the elimination of} a large amount of sugar. Cane sugar is in no way pernicious in this respect,--also starch foods--

Q. Would you prescribe honey in such cases ?

A. Honey would be better than ordinary sugar. We have, in fruit, a food that is free from starch, and if we select acid fruits we have a food which contains very little sugar; in an ordinary sour apple, for instance, we have very little sugar,--we have acid and no starch--and so here we have a food which the diabetic can use freely, and I have often allowed apples in diabetes on that account. Persons who are strong and vigorous and quite fleshy and who have been fed on foods in which there was quite an amount of sugar, and persons whose vital powers have not begun to fail much in consequence of the waste from such substances--such persons I find can be put on a pure apple diet,--and they can have sour oranges if they wish, and lemons if they like, and they can eat peaches in peach time--peaches are mostly water. Now the idea that diabetics should not have fluids is a mistake. I am satisfied that the limiting of water has led to fatal results in many cases of diabetes. The amount of urine is increased by the use of fruit, as well as by the use of water, and it needs to be carried off. You will find in your books the statement that water should be limited in cases of diabetes, and I think it is an error; I have found that to be true again and again for the last twenty-five years. It has always been my custom for the last twenty years,--or within a short time after I commenced practicing, at any rate--to give the patient all the water he wanted to drink,--or, at least a reasonable amount. I have found cases of diabetics in cities, in which the patient wanted to drink more than an ordinary pail-

ful of water in twenty-four hours. I know of a case of this disease of fifteen years' standing,--and he is getting well ; he drinks an ordinary pailful of water in a day. He will get up in the night and take a quart or two right down. A few years ago my father wanted me to investigate the urine of a diabetic patient. I told them I wanted a specimen of twenty-four hours ^{production} of the patient's urine. The next day, to my surprise I saw a truck with a basket full of cans of fluid ; there was twenty-eight pounds of urine produced in one day in that specimen that was sent to me. I mention this fact so that you will see that there is no danger of a diabetic patient's suffering damage from the amount of water which the kidneys have to eliminate. The great damage to the patient is from the solid matters which the kidneys have to take out and by which their labor is increased.

Now fruit affords, as you see, a considerable amount of water, so that fruit is an advantage to the diabetic in that regard. It furnishes water, but not starch. It furnishes a small amount of sugar which is levulose or fruit -sugar, which does not disturb the kidneys. That is another beautiful idea about fruit,--it furnishes sugar which is easily oxidized.

Fruit-acids also favor oxidation. We must take this into account in these cases. A patient suffering from diabetes can almost always be relieved by sugar. If you have a patient suffering from diabetes you may starve him; take away all the food and the sugar will disappear with great rapidity, for starvation favors oxidation. As I have said, a fruit-diet is semi-starvation. But you should not use a fruit diet unless your patient is a vigorous patient. When a patient is already emaciated and reduced in flesh you don't want starvation for that pa-

tient, in any form. He must be put on a diet that will sustain his waning strength. For such a patient you will not try a fruit diet until the sugar disappears, and then you may slowly return to a more solid starch and sugar free diet. You cannot prescribe vigorous exercise for weak patients, as I have said. Some patients you send into the gymnasium and some you send to bed, and it is just as important to send one class of diabetics to bed as it is to send the other class into the gymnasium. If the diabetic patient is emaciated you must send him to bed, otherwise he may be subject to serious troubles--for instance diabetic coma; but if you send him to bed ^{he} you may then have an opportunity to rally his ~~residual~~ vital powers and give him a chance for life.

Q. How about nuts for diabetics?

A. I will take that up in a moment. A fruit and nut diet is one of the best of diets for diabetics, provided the diabetic is not suffering from dilated stomach. There are several kinds of nuts in their ordinary crude states which diabetics cannot take. Sometimes diabetics with dilated stomachs cannot take raw nuts, but they can take preparations of nuts; these are very valuable in such cases.

Now I am not endeavoring to find a use for fruit in every case of diabetics, but in all these cases in which I have actually used a fruit-diet I have found it to be of great service,--either a pure or a modified fruit-diet.

Another class of cases in which fruit - diet is valuable is cases of persons who are convalescing from fevers. In these patients there is always a state of reduced vital resistance, and there is always a tendency to assume some form of indigestion, and the patient is very likely to overeat and get bilious. A fruit-diet is something which you may allow

a patient almost ad libitum, -- I ~~am~~^{might} speaking of a patient who has been sick with a fever and has just begun recovering. Such a patient wants to eat everything; he would like beefsteak, mince-pies, and similar things which he has been accustomed to eat. Noe a fruit-diet is tasty, and in these cases the tongue is coated, and ordinary food is tasteless, and he would like to have something to eat which has a flavor to it. So fruit has a wonderful advantage in this respect, and a patient can satisfy his appetite quite freely on fruits. He can eat three or four times a day if he takes nothing but fruit. But of course a person cannot take an exclusive fruit diet in these cases; they should have a modified fruit-diet.

Fruits are also valuable in cases of dyspepsia. When shall we use fruits in these cases? In the first place we may use fruit for constipation, -- I heard Dr. Paulson talking about that when I came this morning, so I will not review that subject -- except to say that there is no article of food which has greater advantages in cases of constipation than has fruit. It is advantageous, for one reason, because of its bulk. Another reason why fruit is advantageous is, that it contains acid. Most fruits, -- acid and seedy fruits --, and bulky fruits are of great service in constipation. Many persons suffer from constipation ~~is~~ because there is not a sufficient mass of bulk in their food. The alimentary canal of human beings somewhat resembles that of the herbivorous animals, -- the colon is sacculated, like the colon of a sheep or a horse, but not so extensively sacculated, and it is necessary to have sufficient food to distend the colon, otherwise the reflexes whereby the colon would be emptied will not be set up unless there is sufficient fullness to produce the necessary impression upon the sympathetic nerve to

set up the reflex movements by which the contraction of the bowels occurs and the fecal contents are expelled.. We will not go into the philosophy of digestion here. We may say, however, that there is a natural rhythm of the alimentary canal by which the ^{fecal matter} food is moved along. It takes about fourteen hours after food is eaten for it to enter the colon. It enters the caecum and remains there in a semi-fluid state,-- it remains there until it is somewhat increased in consistency so it may be lifted upward, and then it is carried into the transverse colon and finally into the descending colon, and the sigmoid flexure retains the food in the upper part of the colon. Now when food is taken at the next meal there is set up a rhythmical wave in the stomach which passes the whole length of the alimentary canal and the ^{fecal matter} food in the caecum is moved a step farther forward into the colon. When the next meal is taken another ~~xxx~~ ^{occurs} rhythmic wave and the food is moved along another step. So when a person has been accustomed to eating breakfast, dinner and supper, there will be three peristaltic waves set up, --one after each meal. I have sometimes found that when patients discontinued supper the bowels at first become inactive; they do not have the regular ~~peris~~ movements of the bowels the next morning; such patients find themselves suffering from inactivity of the bowels in the morning; their bowels don't move in the morning by reason of the failure of the peristaltic movement after supper, because on taking supper there had been this third peristaltic movement, and, as I have said, this does not take place when the supper is discontinued, consequently the regular movement of the bowels next morning does not occur,--the regular peristaltic wave does not come, the fecal matters remaining in the caecum don't get into the lower part of the colon, and consequently do not

pass into the rectum. Another thing which the patient sometimes experiences in reference to the peristaltic movement on rising in the morning: When they get onto their feet the rhythmical movements of the body are stimulated and the peristaltic movement of the colon is set up. It is for this reason that, in a majority of cases of this kind, ^{of persons} who eat three times a day, the movement of the bowels occurs after breakfast in the morning--about half an hour after breakfast in the morning, because, the peristaltic movement being set up in the stomach and colon, the fecal matters in the colon are moved along, and that which was retained in the caecum is moved on into the transverse colon, and so on into the rectum,--and so there has been a movement all along the line after each meal. It is for this reason that persons who eat two meals a day sometimes have a movement of the bowels twice a day. Some persons complain that they cannot even begin to eat but what there is a desire for a movement of the bowels, and this desire sometimes even interrupts the meal. It is for this reason that I mention to you the fact in these cases ^{when} there is excessive peristalsis, there is excessive motor irritability of the stomach so that a very strong peristalsis is set up. This fact may help you to explain a great many anomalous symptoms which patients complain of. I learned of this fact by some experiments which were made upon a patient in Germany a few years ago. He had a fistula just at the opening of the ileum into the caecum, so that this subject could be studied. Before learning the results of this experiment it was quite a mystery to me that a person should have so many symptoms in relation to the peristaltic movement. When there is not a sufficient bulk of food you can readily see that these regular movements would not take place; the food would perhaps enter the colon and pass

into the caecum, but there is not sufficient bulk to fill the colon properly, so that when the time for the natural evacuation of the bowels comes there is not sufficient bulk to fill that portion of the colon which is next to the rectum and the fecal matters are not moved down into the rectum; they are moved along, but there is not sufficient bulk, but ~~there is not sufficient bulk~~ to influence the nerves which reflexly set up the expulsive movement, ^{and they} do not act upon the fecal matters so as to expel them. So it is necessary that there should be sufficient bulk of food. Some persons do not have a desire for evacuation of the bowels under two or three days, and some, not in several days, and thus the bowels become extremely distended. Of course that is an abnormal condition and exists in persons who have neglected to observe regular habits in the movements of the bowels until the rectum has become accustomed to being filled with fecal matters so that it will tolerate them, and then the normal reflexes will become suppressed, and in these cases you will have to employ other means for the relief of the patient.

But I must mention the fact ^{again} ~~that there is a class of cases in~~ ^{in these} which bulk of food is invaluable. Fruit is advantageous for such cases and may be almost universally used, if the right sort of fruits are selected. The best fruits are those which furnish the most bulk, -- that is, the most indigestible residue, not the ~~most~~ bulk; still both things are useful. Bulky food is that which contains materials which will distend the stomach, and has a tendency to stimulate the bowels. Many patients find that they suffer from inactivity of the bowels when there is not sufficient bulk, and the stomach will not contract upon the food. You must have the peristaltic movement in the stomach before you can get peristalsis to stimulate the intestine. So you will find ap-

ples advantageous, and then figs come next; they contain a large amount of digestible residue residue. The seeds also help to form bulk. Some persons cannot take the seeds very well. Acid fruits like plums and cherries are also helpful.

Q. Then, to accomplish this result, you leave the skins on the apples and other fruits?

A. I am glad you have raised that point,--should we eat the skins and seeds? These are indigestible residue. There are some persons who say they always eat the skins of apples, and that if they don't eat the skins of the apples they don't stimulate the bowels. I have no objection. I don't think there is any harm in healthy persons eating the skins; the healthy stomach is perfectly able to take care of apple-skins,--but the majority of ^{invalids} adults do not have healthy stomachs, *so* and it is wise not to recommend the skins and seeds of fruits for invalids. I would prefer,--and I think most persons would prefer to remove the skins. If it is a tough, horny, indigestible substance--

Q. May not fruits increase flesh?

A. Yes,--I should have mentioned that, in reference to convalescents from fevers. In these cases sweet fruits tend to increase flesh. Baked, sweet apples, and figs, particularly, are extremely helpful in these cases for they tend to increase flesh. But it must ~~be~~ not be an exclusive fruit diet. Stewed grapes are extremely helpful. And fruit-juices are of very great value in cases of convalescence from fevers.

Q. How about raspberries, etc. causing constipation?

A. I have never seen any tendency to cause constipation from the use of such fruits. Raspberries ^{or blackberries} are used by some in cases of diarrhoea

rheea, with the supposition that they are beneficial, but I am satisfied that that is purely prejudice. There is astringency in the ^{blackberry} root, and so it is supposed that there is astringency in the berry. Many people use blackberry-roots and the blackberry root is astringent, but the blackberry is not astringent. The blackberry is useful because it is a germicide--or rather, because it encourages an aseptic condition of the alimentary canal.

Q. Indians sometimes make a rose-decoction for diarrhoea.

a. Yes. The rose is astringent; rose-leaves are slightly astringent.

Q. What about a moderate amount of grape-seeds being stimulating peristalsis?

A. Well the patient who has a dilated stomach must avoid them,--also a person having a sacculated ~~stomach~~ colon, for the seeds are likely to accumulate ~~there~~ in the bowels; all kinds of indigestible materials are likely to accumulate. Sometimes we must be careful about the use of charcoal,--charcoal is comparatively harmless, however, because it is an antiseptic, and I have never known a case in which it set up inflammation or irritation.

Q. Do the seeds of figs have any injurious action in the colon?

A. They are very small, and I have never known cases in which they did harm, but they must be thoroughly cooked.

Now, in cases of ordinary indigestion, and in relation to the secreting work of the stomach I will speak for a few minutes: In cases of hypopepsia, shall we use fruit? and if so, what kind of fruit? What observations have existed in reference to this subject? In hypopep-

sia we have a deficiency of chlorine secreted, and along with this deficiency of chlorine there is usually motor insufficiency as well. Hypopepsia, in a majority of cases, is a degenerating hyperpepsia. Hyperpepsia is the natural result of excessive stimulation of the stomach, and hypopepsia is simply a reaction from hyperpepsia. Hyperpepsia after a while becomes hypopepsia,--it does so, when the stomach-glands are worn out and have lost their power to secrete digestive fluids. Hypopepsia exists as the result of acute inflammatory conditions; it exists in a majority of fever cases. Another cause which establishes this condition is a limited flow of blood. So it is possible that the same thing might be good for both hyperpepsia and hypopepsia; but in hypopepsia we have a diminished secretion of chlorine, and here we have an indication for peptogens. Now in fruits we have dextrin and chloro-dextrin; here you will get no reaction for starch by the iodine test, but you have the chloro-dextrin and you also have the sugar., both of which are peptogens of the best quality. So we have in fruits a means for stimulating the secretion of the gastric juice. In hypopepsia we have generally a motor insufficiency, and consequently it is necessary to take such foods as will be readily removed from the stomach, and to avoid the taking of foods which are hard to disintegrate. It is important in hyperpepsia that the food should be removed as quickly as possible from the stomach so that it will not ferment, because there is a tendency to delay and stagnate the food in hyperpepsia and if the food remains too long in the stomach, fermentation will take place, and why? Because there is not a sufficiency of hydrochloric acid. Suppose we wash the stomach out and then take sterile food,--food which does not encourage the development of germs: Still we are continually infecting our food; we are continually infecting our food, after we

eat, by swallowing the saliva which contains a great quantity of germs. Germs find their way down into the back of the throat and down into the stomach so that the stomach is infected. In the treatment of hypopepsia, then, we would prefer the use of those foods which are well ~~disin-~~tegrated ripened and easily disintegrated. We find fruit-juices an excellent remedy in these cases. But we must be careful and not give a patient too much sugar with the fruits. We are likely to use too much cane-sugar in the use of fruits. The better way is to combine acid fruits with sweet fruits. Figs contain a large amount of sugar,--about fifty percent., and this is an excellent sort of sweetening;--if we must employ sweets it would be better to employ the natural sweets. Honey is better than cane-sugar. You may also use sugars which are produced by a natural diastase, such as malt-sugar. These sweets must not be made by purely chemical processes,--for instance, "maltose." Much of what is sold as maltose is made from Ohio corn.

We often find ~~We often find~~ a pure fruit diet, for a time, a most excellent thing to start with in the treatment of hypopepsia, for the purpose of disinfecting the stomach thoroughly and giving it a good start. But we must be very careful and not give the patient too much fruit at a time. In hypopepsia the stomach is already distended, and in cases of dilatation of the stomach it is necessary to prescribe a dry diet for ^{a time} ~~him~~, so it is better not to use too bulky food in cases of hypopepsia. Now in hyperpepsia some adopt the same rule as in hypopepsia provided infection is present. But now the question is, Should we use fruits in all cases of infection? ~~And~~ What kind of infection are we most likely to find in hyperpepsia? What sort of organisms are we most likely to find in cases of hyperpepsia? ("Yeast.") Yes. Now suppose we know that the stomach is infected with yeast,--would it be

likely that a fruit diet would prove a good antiseptic? Would it be a good means of disinfecting the stomach in case the infection was a yeast infection,--what do you think about that? That is an exception to the ordinary rule,--would fruit be an excellent thing for disinfecting the stomach when the stomach is infected with yeast? ("No.")

Why not? Because fruits contain the very elements which are contained in yeast; yeast fermentation is an acid fermentation, so the acid of fruits would not discourage the ^{growth} acid of yeast, and the dex- trins etc. of fruit would encourage the growth of germs. So fruit-juices are the best kind of culture-media for yeast. That explains the fermentation of apple-juice and of fruit-juice, and of wine and cider. And then, following that, suppose we had a patient suffering from acetic acid fermentation,--would that be encouraged, or could we discourage it by the use of fruit? It would be doubtful whether we would find fruit useful in these cases. So that, in hyperpepsia, with a yeast infection we cannot depend upon fruit for disinfection of the stomach and in such cases we should especially avoid the use of acid fruits. It might be that by the use of fresh fruits we might encourage the stomach to some degree to maintain its integrity. The best way to deal with hyperpepsia with a case in which there is acid fermentation, would be to wash out, and perhaps give the patient alkalis directly after his meal, and give him starch-digested or heat-digested cereals. When you come to study this subject in Physiological Chemistry this point will be brought to your attention,--that in the digestion of starch we have four steps,--

1. Solution of starch (we are speaking now of hydrated starch) amyloextrin,
2. Erythroextrin,
3. Acroöextrin,, and
4. Maltose.

Now we may have amyloextrin produced by a slight cooking of the starch. It requires longer cooking to produce erythroextrin. In half-cooked cereals such as you find inside of an ordinary loaf of bread, you will find a large amount of erythroextrin; a much more thorough cooking will produce acroöextrin, and this you will find in the brown crust of the bread. (You can make experiments with iodine.). Now in cases of hyperpepsia a dry diet should be given, in which the starch is as nearly digested as possible, so that during the short interval of the early part of the digestive process before the acids have been formed sufficiently to neutralize the action of the saliva--during that short interval the saliva may have time to convert this acroöextrin into sugar. We do not want to eat acid fruits along with the starch; we want to avoid acid fruits in hyperpepsia, because acid fruits taken with starch would lessen the time in which the amount of acid formed is sufficient to inhibit the action of the saliva,--the acid of fruits would increase the acidity of the stomach contents and in that way lessen the power of starch-digestion, and the acroöextrin taken into the stomach undigested would be very readily fermented by the action of the yeast that is present, so that in that case we should have acid fruits

encouraging fermentation . (I hope that point is clear to you.) . We are always taking in some yeast, but the stomach fluids will ordinarily take care of this, but when a person takes it in his food--when he takes ordinary bread, for instance, he takes yeast right in with his meal. So when the patient is eating fermented bread and taking fruit along with it, he is taking yeast right into his stomach, thus putting together in the stomach the materials most favorable for the production of fermentation. The patient is doing the same thing when he eats ordinary gems; The soft inside of the gem contains germs alive and all ready to grow; it only requires a favorable medium. Now this yeast in a condition in which it is not readily digested--a condition in which only the first two steps of the digestive process have been performed--it requires considerable time yet for the completion of starch digestion--it is ready to encourage the growth of yeast - germs. So, if the patient takes fruit and ordinary raised bread with the fruit he will have difficulty ~~of~~ in digesting the fruit. But suppose we give the patient fruit, and suppose that, instead of yeast-bread, we give him bread in which the starch has been completely converted ,-- these difficulties will disappear.

I would like to talk a little more about fruit - diet, for that is a matter of immense importance, as I believe, and its importance is going to be recognized more generally than it has been. I find that the few articles which I have published on the subject have been widely scattered. We were speaking of the reason why fermentation occurs with a fruit-diet in hyperpepsia. This question puzzled me for fifteen or sixteen years. In hyperpepsia it would seem that the hydrochloric acid ought to kill the germs,--and why didn't it ? . We know it does not

kill yeast, and it is yeast that produces acid fermentation in the stomach, and so our patient says "I can't take acid fruits without producing fermentation and distension of the stomach." Now a patient taking a breakfast consisting of fruits showed no germs because the food contained no germs; but when we give the patient fermented bread--imperfectly cooked bread containing yeast, and then give the patient in addition to that--although that alone is sufficient to produce fermentation and sour stomach--but give a patient in addition to that, acid fruits, and they will so far interfere with digestion that they increase the yeast-germs, forming a germ-culture, encourage the growth of germs, and fermentation is produced.

Perhaps the question will arise here, "How is it that fruit-acids interfere with salivary digestion in the stomach when it don't interfere with it in the test-tube?" As I have said, ordinary fruit-juices don't interfere, to any degree, with salivary digestion in the test-tube because the acid of fruit is not pernicious to the ptyalin of the saliva. Oxalic-acid does inhibit the action of saliva, and the same is true of ascorbic-acid to a wonderful degree, but organic-acids or fruit-acids do not, to any great extent, interfere with salivary digestion in the test-tube. You would be surprised to see how comparatively small is the effect of lemon-acid or citric acid upon salivary digestion. I was for some time perplexed to know why lemon-acids or fruit-acids should interfere with salivary digestion in the stomach when diluted to such a degree that they would not at all interfere with the digestion of starch in a test-tube, if you would take that lemon-juice at an ordinary meal, you

not interfere with salivary digestion.. A couple of years ago Dr. Holden found that when fruit-acids have been diluted three or four times they have no influence in the test-tube; but that ^{the} same fluid takes effect in the stomach because of the shortness of the ^{time} in which the acidity of the stomach reaches the point when it interferes with the action of the saliva; it increases the acidity of the stomach and neutralizes the alkali of the saliva, and it also encourages by its presence the growth of the yeast-germ--

Q. I don't see why fruits and grains would not be an excellent combination.

A. They would be, in a normal stomach; a stomach that is normal has no yeast in it to interfere with digestion. .If we want to use fruits and grains together in hyperpepsia, we must be careful that our grains are perfectly cooked. The perfect cooking of grains brings them to a condition in which the starch is converted into acroódextrin.

Many patients can eat zwieback and fruit but they cannot eat ordinary bread,--they don't know why. Here you see the reason: In zwieback the ~~starch~~ has been converted into acroódextrin, while in ordinary bread the starch has only reached the stage of erythrodextrin and contains living germs,--and here is an explanation of the reason why persons with hyperpepsia cannot take acid fruits, even though the stomach-fluids show no yeast; they sometimes take the yeast right along with the fruit. Fruit often has germs on the outside and one takes them--and especially in the use of fruit which one takes whole, like the strawberry. Many persons suffer from indigestion after the strawberry season comes on, and they suffer from indigestion for the reason that they cannot take strawberries and ordinary raised bread at the

same time. Many people say that fruits disagree with them, but they want such combinations as strawberries and cream with bread and butter. See what a beautiful combination that is for the cultivation of yeast in the stomach to interfere with digestion. I dare say it looks to you like a loathesome combination,--I am sorry to see some of you smacking your lips. I confess, for myself, that strawberries and cream and sugar have not the slightest temptation to me. I remember very well when it was a temptation; but it seems a perfectly loathesome thing to me now, because I think of the consequences;--I think of the agile movements which the germs will make in my stomach, and I think how that combination of strawberries and cream and sugar would look half an hour after it was eaten--I take an introspective view of it. I hope that in your experiments you will look into this subject quite thoroughly,--you will find enough in the cooking of starch to keep you busy for the next month if you go into it thoroughly. I hope you will bring out some new facts,--as I propose to publish the results of this investigation, and any one of you who does creditable work will be credited for it when the result is published. We hope to publish the results in *Modern Medicine*, and we will give each of you proper credit. I hope something will be done that will add to the sum of human knowledge

There is a great field open before us for investigation of fruit-diet.

What a wonderful opportunity there is for this work! There are twenty things that we don't know to one thing that we do know, and it is important to learn new things, and to place those things that we do know upon a more thoroughly scientific basis.

Q. Could you use acid-fruits with nuts, if you used used them alone?

A. Yes. When a person is suffering from hyperpepsia you can give him acid fruits if you are careful to determine that his stomach does not contain yeast-germs ~~already~~, and if you are careful not to give him any more. But if you give him acid-fruits along with yeast-bread you produce a condition of things that would be a disadvantage to him.--

Q. Are cultures of yeast-germs liable to remain in the stomach of a person suffering from hyperpepsia?

A. In cases of cancer we know that yeast remains in the stomach even when there is no hyperpepsia. We know that condition favors the growth of yeast-germs, but I am inclined to think that in hyperpepsia the stomach will disinfect itself if you don't give the stomach food for yeast-germs.

This would explain the reason why persons suffering from hyperpepsia will say they have been wonderfully relieved by a meat-diet. They are deceived by that fact. The use of a flesh-diet renders the production of gas-producing germs in the stomach impossible, so the patient does not suffer from the distension of his stomach with gas as before,--he is not troubled with flatulence as before, and he does not suffer as before from acid burning in his stomach. Many patients with hyperpepsia have a constant regurgitation of gas,--the stomach seems to be a gasometer, carbonic-acid gas is pouring out at such a rate. Now a meat diet suppresses all that because there is nothing in meat for that class of germs to feed upon. A meat-diet neutralizes the hydrochloric-acid to some degree, and so the patient thinks he is better. It was for a long time a question with me how to deal with such cases. I tried meat four or five times for this class of patients some seventeen or eighteen years ago. I did not then understand why meat relieves cases of

hyperpepsia. But I found that a meat diet encouraged the production of diseases which did not then exist in the patient, and I found that I must discontinue the meat-diet if the patient ever got well. The patient would sometimes say to me, "Doctor, I am tired of this meat-diet,--"and I was glad of it, for my conscience smote me all the time I was prescribing meat. But I didn't know what to do,--I had to do something to make patients comfortable. When I gave the patient fruits and grains he was uncomfortable and he wouldn't stand it, and he would say, "I am wretched now, and, ^{I read} ~~more~~ uncomfortable ~~than~~ when I first came here." That was true, because when he came here he was taking a modified meat-diet, or perhaps an exclusive meat-diet, and was comfortable. But with a diet of fruits and grains,--bread, apples and other things of that kind, he was as miserable as he could be. But this difficulty was solved by knowing two or three things,--in the first place by knowing that yeast-bread, ordinary bread --even rolls and gems--all contain yeast germs which are liable to grow and develop in the stomach, and that by combining acid-fruits with these yeast-breads, we produce a condition in the stomach the most favorable possible for fermentation. Then we know further, that by taking our food in a fluid or moist state there is very little saliva mixed with it. Now if we take a dry diet of ^{sweet fruits and} bread that is completely cooked,--and completely cooked, means that it is cooked until it is slightly brown all through--avoiding the use of acid-fruits, using sweet fruits and dry bread completely cooked, or dry cereals perfectly cooked--sweet fruits and unleavened bread--the bread must be unleavened, it must be dry, and it must be perfectly cooked--it must have these three properties, and then it can be combined with sweet fruits. When we make that kind of combination we will have but

little trouble in the use of fruits and breads or fruits and grains in acid dyspepsia. But if, for instance, we give our patient half-cooked oatmeal mush, cracked-wheat mush or other similar mushes of various sorts, and soft, perhaps slightly baked white bread, or sticky gems, imperfectly cooked crackers, crackers that are perfectly white--even whole-wheat crackers slightly cooked, and if we give them acid fruits and highly seasoned foods, starch mixed with fat, and if the patient bolts his food in large chunks in which the saliva is but slightly mixed, we will furnish conditions for a most thoroughgoing acid-dyspepsia and have a most troublesome time.

When the patient takes dry food a large amount of saliva is mixed with it, if thoroughly chewed; it must be thoroughly chewed and disintegrated. So we find that the patient will have some trouble with zwieback for the reason that it is hard, and his teeth are imperfect, or they don't fit each other, --they don't oppose each other exactly; a person may have one or two back teeth out, and just enough out so the teeth don't fit together and the person can't grind his food into fine particles. It is necessary that the teeth of the upper jaw shall fit those of the lower jaw. There may be a tooth gone in the back part of the mouth, and when the food is chewed some it goes into the back part of the mouth and large portions will fall into that vacant space where the tooth is gone, --I don't know as you have had that experience, but I have--I lost one back double-tooth and since that, I can't eat zwieback, so it is impossible for me to masticate zwieback or any other kind of hard food without taking four or five times as long in doing it as I formerly did. So I find that the teeth must be taken into account in the treatment of dyspeptics, --we must examine their teeth. Before

we prescribe ~~zwieback~~ for a patient we must see whether he can grind it. If one or two of the back teeth are gone, it furnishes a crack into which particles of food fall, and in hyperpepsia these produce an immense amount of trouble, because by this means there might twenty-five or thirty ^{coarse} particles of zwieback remain in the stomach not dissolved while the hydrochloric acid is not secreted in sufficient quantity to render the saliva inactive, but there is perhaps just enough to set up fermentation, and so the patient will have gas and eructations; so this must be considered.

I find, on this account, that our granose, which can be ~~swallowed~~ masticated without any teeth at all, is a wonderful blessing for persons suffering from hyperpepsia; I don't know what we would do for such people without granose. I find that granose in the form of biscuit split and thoroughly toasted on both sides makes a cereal food which is more readily digested than any other food that I know of. In the first place it is cooked thoroughly; then it is reduced to very thin flakes; then these flakes are compressed into cakes, put into an oven at once and baked until the flakes are slightly brown. That means that it has attained the stage of ^{acrodextrin}. Then it is pressed into cakes; then the cakes are split and toasted so that the interior of the cake as well as the outside has all been exposed to a high temperature, and then you have a food which you can crumble between your fingers, and when a cake is put into a glass of water ^{it} immediately separates into fine particles and fills the glass; there are no masses and chunks,--it is simply minute particles. So we find that when a patient is suffering from hyperpepsia we can give him, with great advantage, well-toasted granose-cakes or flakes. He can take it dry,--and it is very fortunate that he can take it dry. A piece of zwieback is more tasty than a

piece of dry bread; the starch has been reduced to the stage of acroö-dextrin, which is readily soluble, and when taken into the mouth it is instantly converted into sugar. You can try that experiment,--make a solution of zwieback, drop a little saliva into the test-tube with the zwieback solution, shake it up and then test it for sugar, and you will find that sugar is there, and you will get a reaction immediately after putting in a little of Fehling's solution,--it should be boiled. This shows that the zwieback has been instantaneously converted into sugar by the saliva.

When food is thoroughly chewed before being taken into the stomach, so that there is a large amount of saliva mixed with it, it is readily digested and less likely to produce fermentation in the stomach than it would be if this were not done. Granose in the form of cakes or flakes has the advantage that it requires mastication--not because it is hard but because it is dry. If it is only half masticated you can't swallow it any more than you can swallow flour, so it must be masticated in order to be swallowed. But it is easily broken up into minute particles, consequently it is a food that can be taken by a person with imperfect teeth, or no teeth, as well as it could be with sound teeth. This is important in connection with the question of combination of foods.

Q. How about the use of lemon-juice in hypopepsia?

A. There is no disadvantage in that. I find that in many cases of hypopepsia it is an advantage to give the patient lemon-juice--or, better, orange -juice. Oranges contain a large amount of citric-acid. The patient may take a half a glass of orange-juice before breakfast, or

take two or three oranges half an hour before breakfast. This is a very good plan in hypopepsia; it kills germs--or rather, it prepares the stomach for the reception of food by inhibiting the development of germs.

Q. In hyperpepsia, some foods taken tend to increase the disease in some cases. Is that because the food is not masticated thoroughly? It seems to produce in the stomach excessive irritation, causing the production of an excessive quantity of gastric juice.

A. In very extreme cases of hyperpepsia the mucous membrane is ~~irritated~~ eroded and irritated, and by the contact of dry food it is still more irritated. In these cases we are obliged to give the patient a fluid diet for a while. We find in these cases that buttermilk is often useful, and sometimes even kumyss, which is very slightly acid, is helpful. It is necessary in some of these cases to give the patient a fluid diet so that the food may pass out of the stomach as quickly as possible. Granose requires two or three hours' digestive work in the stomach because of the gluten which it contains, consequently it would not be the best food in cases of ulceration of the stomach. In these cases we must give a fluid diet in order to tax the stomach as little as possible in extreme cases of hyperpepsia,--but we were speaking of ordinary cases of hyperpepsia..

I might say a word here about apepsia: In apepsia we have extreme hypopepsia. The same principle applies to the treatment of apepsia as to hypopepsia,--only we must be a little more particular in apepsia than in hypopepsia. In apepsia it is important to give the patient an absolute fruit-diet for a time, until the stomach becomes thoroughly disinfected and the germs are all starved out. Now in simple dyspepsia it is not necessary to enforce a strict fruit dietary in a

majority of cases,--at least only for a short time.

Now, the fruit regimen itself,--what is it, and how should it be conducted? I may say, in the first place, that we have two forms of fruit diet,--a fruit-diet proper, or, we will say, a strict fruit regimen, in which the patient takes nothing but fruit for a limited period of time--or almost nothing but fruit. In this dietary, if the patient takes anything else at all it must be simply a bit of dry zwieback, crust or a piece of granose cake--a small bit taken along with his fruit.. It is very important that the patient should not take ordinary bread in these cases, for the reason that ordinary bread contains starch, and taking a large amount of fruit and taking yeast with it would be equivalent to expressing the juice from a quantity of apples and then putting in with it a quantity of yeast and allowing it to ferment. a large amount of fruit taken into the stomach would be likely to remain there some little time.

We have also a modified fruit diet and an exclusive ^{fruit-} diet,-- we will first speak of the exclusive fruit-diet : In an exclusive fruit-diet the fruit must be taken when the stomach contains no other food, and taken without other food, with the exception that he might take, twice a day, a small bit of crust, zwieback or granose when the diet is long-continued; but when the patient takes a strict fruit-dietary for a short time, he will take nothing but the fruit for two or three days--or perhaps only for a single day,--but generally it will be a fruit diet for a week, or perhaps two weeks,--or as long as six weeks. If a person takes a fruit dietary for six weeks, he must have something besides fruit,--that is, he should take some cereal food or fat-containing food--but only a small amount of this should be taken.

There are a few rules in fruit-diet which it is important to consider,--first, we will speak of the number of meals--how many meals may a person eat in a day on a fruit-diet? He may eat two or three times a day; once or twice a day is not sufficient, if a person eats fruit; for, in a short time he complains that he feels hungry. That is an indication of the readiness with which the stomach empties itself of fruit. A person, in two or three hours after eating freely of fruit will find that he is quite hungry. This is also, perhaps, an indication of the favorable influence of a fruit-diet upon the appetite,--that it encourages those vital processes which result in the production of appetite.. We might say such a person may eat four times a day. A person who is taking a fruit-diet generally wants something to eat once in four hours. We might say that such a person may take his first meal in the morning at 7 o'clock, his second meal at 11 o'clock, the next at 3 o'clock, and the ~~last~~^{meal} at 7 o'clock or two or three hours before going to bed.

Now in reference to the quantity of food : The person who is taking a fruit-diet,--if he takes grapes, raisins or figs, he cannot take the same amount as he could of other fruits which are less nutritious. The grape-cure is an almost perfected form of fruit-cure, and is the best experimented form of fruit-diet, has been practiced in Switzerland for many ages; it has also been practiced in this country to some extent, and in Italy and in Australia, in Cape Town, in California and in Cincinnati, O. The grape-cure has been established and carried on in these places for a long time. Where it has been employed, it has been the custom, in grape-harvest to give the patient from four to eight pounds of grapes daily,--and I have known the quantity to be increased to twelve or fourteen pounds, but four to eight pounds is the amount generally prescribed to be taken. Grapes must be taken for the meal, very

little other food being taken.

Now with reference to other foods which a person can take with the grape-cure: In the grape-cure as practiced in Switzerland and other places, it is quite seldom that the patient is required to take nothing but fruits. The fruit-diet has not been practiced there as we practice it here,--in Switzerland, for example, he might use yeast-foods; but he must abstain from meats,--he must take no meats or fats or greasy foods of any kind, and no cheese. And he must take his fruit, as far as possible, when his stomach is free from all other foods. Meats and cheese and greasy foods of all kinds the patient must avoid. And that has been the practice in reference to the grape-cure for hundreds of years while the patient is practicing the grape-cure. ^{We see} And the reason why the patient is required to avoid meats is, that they encourage the growth of germs in spite of the beneficial influence of grapes. We also see the reason why the patient should not eat cheese,--because it contains germs--the things which we are trying to get rid of. And we see the reason he should not take greasy foods,--because by this means the fruit will remain in the stomach, and thus aggravate the very things we are trying to cure.

Now people have practiced the grape-cure without understanding these principles; they have practiced it in accordance with an anti-septic regimen and in accordance with rules found necessary by experience.

Q. I would like to ask whether yeast-germs are found in hypopepsia or apepsia.

A. Yes, yeast-germs are sometimes found in these cases, but I think they are not found in so great quantity as in hyperpepsia...

31.

Q. Then should we use fruit-diet in hypopepsia where the yeast-germ is found?

A. I think that in hypopepsia yeast does not flourish, and hence fruit-diet will not interfere--

Q. Is not a fruit-lunch at night beneficial? It seems to me that I feel better in the morning after having taken a fruit-lunch the night before. It has been a query in my mind as to whether or not that would not be a physiological benefit.

A. I see you are all looking up with a look of expectancy in the hope that I will set you to experimenting upon that question. I think you had better study the case of the querist (Mr. Thomason), and see how this is. Or Mr. Thomason might investigate by a test-meal before breakfast with and without the lunch the night before, and count the germs,--find out whether they are greater or less. But the question is, whether the good feeling in the morning may not be due due to the satisfaction of having eaten fruit the night before and hence the number of microbes must be lessened,--the thing to find out is, whether this is a bacteriological or a psychological question.

Q. Where one cannot get good water readily--for instance in Chicago, and one wanted to drink at night, would it be not be the better way to eat fruit than to take the poor water?

A. Use fruit; that is better than to take Chicago water. I must say, in regard to oranges that they are really and practically a drink and not a food, and I do not think a person is violating the laws of dietetics if he takes an orange at any time of day. I don't do now exactly as I did when a boy, for I used to take fruit at any time, and between meals; I don't think we ought to commend the use of fruit between meals,--it is an extremely bad habit to be nibbling between

meals. My experience has been that when I have worked quite late and have had no dinner, if I would take a small fruit-meal about 7 o'clock, working afterwards until about 1 o'clock in the morning, I would suffer no inconvenience in the morning; but if I took fruit at 9 o'clock at night, I didn't feel so well in the morning, because when the stomach is laboring in the night to dispose of the food the gastric glands are brought into a condition in which they are not so well prepared to secrete digestive fluid in the morning as if they had been at rest. But I think we must recognize the fact that fruit-juices are a good disinfectant. I have often prescribed fruit for the ordinary third meal, instead of bread and butter and tea, which is about as bad as can be for digestion,--increasing the indigestibility of people,--and when they eat fruit and also take bread and butter and tea for supper ^{they} will complain of the fruit, repeating the old adage, "Fruit is golden for breakfast, silver for dinner and lead for supper.". If one feels distressed at night, he may take an orange; if he is troubled with faintness at night, so that it is difficult to sleep he might take a little fruit--a baked apple, or something of that kind. But we must be careful; it is easy to creep on up from fruit to bread, etc., and to a whole meal for supper. I think we are all thoroughly committed to the principle that two meals a day is the physiological plan and the better plan, and we want to propagate that idea and bring other people to it. So we must be careful not to do or say anything that would weaken our argument or our influence in that respect.

Now a word about a modified fruit-dietary:--These facts that I am giving you are valuable and will help you in solving some puzzling questions. Fruit-dietary has come to stay. The principle is growing,

and it will not be long before it is going to be recognized and appreciated by the doctors. We are going to blow the trumpet along this line until this principle is appreciated. Progressive men will take it up and find that this antiseptic which God has given us is worth more than all the drugs and other remedies that can be found. The Scandinavians say "Every man has ^{his} name on his own trencher (2)" Our bodies are made of what we eat.--

MR. THOMASON: Cannibals are said to have ^{had} the idea that they acquired the courage of those whom they ate.

DR. KELLOGG: Yes, when savages practiced cannibalism they had that idea,--that they had their courage and also their property. One savage is said to have proved that certain property belonged to him because he had eaten its owner. One cannibal is reported to have said "The more noble the animal the more noble the diet." The principle is good when applied to fruits, for in fruit we have the noblest of all foods.. In bananas you have 25.8% (reading from table of nutritive values.) So the banana is the best food--much better than potatoes,--a person could live on bananas.---Now a few words about a modified fruit-dietary: It is ~~we~~ found necessary in extreme cases and for short intervals to confine the dyspeptic patient on an exclusive fruit -diet; but I am satisfied that if you want to get the best effects of a fruit diet and such effects as you would get from chemical antiseptics or lavage of the stomach,--suppose for example you want to dispense with lavage of the stomach, or dispense with chemical antiseptics--then you must adopt a fruit dietary. It is much pleasanter, for instance, to swallow a peach than it is to swallow a stomach-tube.

Now I will repeat : It is very rarely necessary to use an exclusive fruit dietary for any considerable length of time. We use it as we do lavage, for cleansing the stomach. When we use an exclusive

fruit-diet for two or three days we will see the results of a pure, strict diet. But during that time the patient takes nothing but fruit--or very little else.. Grapes are ^{not} accessible in all seasons of the year, but raisins may be used by soaking them over night and ~~taking off~~ their skins are then perfectly tender (I think you have a good example of this at the Dormitory), and thus raisins make a very good substitute for grapes,--I think a raisin-cure is just as good as a grape-cure--provided the raisins are perfectly cooked.

Now a word about cooking raisins : Raisins must be soaked over night. Then they must be cooked for several hours with a very small amount of water. I have found that the best way to cook raisins is to soak them over night with just water enough to cover them. Then put them in a can and seal up the can and cook them in a saturated solution of salt water. Cook them at a temperature a little above the boiling point. Then when we open the can we have the raisin with its flavor,--the aroma is not "wasted on the desert air."--

Q. How long do you cook it?

A. They are cooked ~~an hour~~ under a steam pressure of 220" to 230" in a retort; they are cooked for several hours,--they are cooked until they are tender; they are prepared in this way now at the Laboratory.

Now we say to the patient who is to take a fruit -diet: "It is not necessary for you to take grapes wholly; take a variety of fruits,--apples, peaches, plums, cherries, raisins, grapes, figs and bananas; these and various other fruits are entirely permissible.

Now for fear I may forget it, I want to show you a specimen of the bread-fruit which affords sustenance to such a large number of people in tropical countries. I should say a word about this fruit, as it is

quite a remarkable fruit, and you may find it of advantage to use it in foreign lands, as it is so largely used in foreign countries. The bread-fruit grows upon trees. It is ^{not} usually eaten when green. It contains starch then. (Showing fruit.) This represents the fruit in its green state. This is a fragment of the dried fruit; when the skin is removed the inside is a large white pulp, which, when cooked, is mealy-- in fact when it becomes real ripe it is mealy like a mealy potato or apple. When the fruit is ripe the starch is converted into sugar and then it becomes sweet and the natives eat it in that condition. It gets moldy on the outside before it is ripe on the inside, and the natives don't eat it then; they gather it when it is perfectly ripe and bury it in pits several feet deep and cover it with palm-leaves and let it become a solidified mass undergoing decomposition, and then it is of the consistency of cheese,--and it is very much like cheese,--it is so aromatic that you can smell it for several miles,--it is like Limberger--it "smells to heaven." This cheese is eaten very much by the natives; they take it to their huts and cook it, and then it can be smelled a long distance I am told. This that I have here is put up in its dried state,--you can taste it if you wish. It must be soaked over night, and then it is prepared. I have here two samples. Here is some that has been soaked over night and it has become quite soft so that it can be eaten. It is almost tasteless; it has a little flavor which you wouldn't like at first, but it is delicious; it is generally served up with some kind of sauce.

Now a word more in reference to a modified fruit-dietary: The average patient after he has taken a strict fruit dietary for three or four days can then be put on a modified fruit -diet,--and modified in several ways,--we may modify it in this way--we may say to the patient,

CRANES

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"You must take a strict fruit-diet one day in the week regularly." That takes the place of lavage. The stomach accumulates impurities and germs, but if a person takes a fruit diet in this way he will be able to keep himself in good digesting trim and his stomach will do fairly good work. Then we may say to the patient, "Use fruit freely with your food¹ you may say to the patient, "Take fruit - diet for breakfast every day,--take a breakfast of fruit every day. " I find that an excellent plan for myself; when I am tired and lose sleep I always take fruit for breakfast , and nothing else. If you are obliged to take a late breakfast and expect to take dinner at 5 o'clock, take a fruit-breakfast; that will digest quickly and you will have a good appetite for dinner.

Another precaution which I think is a good one for persons accustomed to taking three meals a day: Make the noon-meal the principal meal. School-teachers and others who have to take three meals a day will ask you how to manage it. They may take fruit for breakfast , fruit for supper, and the solid meal for dinner,--or they could take two half-meals and one whole meal,--but this plan is for sick people rather than for well people. I find it best to have a modified fruit dietary, taking apples, bananas, etc., and a sufficient quantity of other food.

I have not yet had an opportunity to say anything about nuts, but I will perhaps have an opportunity to do so at some other time. I am going to take a little trip to Mexico, and when I come back we will talk about nuts, and in the mean time you will have made some experiments

with nuts and will be able to tell me something about them.

I want to say a word about your vacation-work, in which I am greatly interested. I have been endeavoring to gain all the information I could in regard to the results of your work. We are trying to follow it up, and we are taking careful note of all the information you have sent in,--I am sorry some of you didn't send in more; we want all the information we can get,--I am sorry we didn't get an every-day report from you. Next time, we will enter into a written contract with you, so that we'll be sure to get them, and we hoped to have a daily report ^{from} of every one of you; it would have made a splendid history; next time we will see if we can't make that history.

I am very anxious about this matter. Our medical missionary work stands upon its own legs. We have no financial support from any source. The General Conference are getting into such straits that they feel that they cannot afford ^{anything} for medical missionary work; that they can afford nothing to support medical missionaries. But it is very necessary that we should go out and educate the people--especially our own people. It seems to me to be a sad thing, that while Baptists, Methodists, Presbyterians, and even the heathen can have health-principles presented to them, Seventh-day Adventists cannot. Now, as I said, we have got to depend upon our own resources, and our people must be trained to give ^{time,} thought, and attention to these principles.

In collecting the results of this campaign that has recently been made, I am glad to say that ~~they~~ they are very substantial. Quite a large number of farms have been dedicated to the Lord and many homes have been opened, and the Medical Missionary Board is determined to follow up this work. I hope you will keep up correspondence with people whom you have met. You must have met many friends and established con-

confidence in them, and you should follow this up by correspondence. Don't spend your time, however, in letter-writing and gossip, but in missionary work among these people, and I am sure it will be a delight to cultivate the seed which you have planted and see the crop growing,--and you may have an opportunity to visit the same places again and see the result of your labors.

We want to make this a substantial work. One conference president has said that this was a spasmodic affair, and that it would be over in a short time. That is not true. This work has been growing for thirty-two years, and it has grown and spread until it has extended around the world. Seventh-day Adventists must take hold of this work,--and they are taking hold of it. I believe this is one of the things that is going to try, and test, and shake the Seventh-day Adventist denomination, and we can now see a line being drawn right straight through it, and your vacation experience is one of the means which the Lord has used for the purpose of testing the people. Now we want to be sure that we are on the right side ourselves, all the time,, and if we are, the Lord will use us as a means of helping others.

We are right in the midst of the most perilous time this people has yet seen,--and in the most perilous time the world has ever seen,--but we don't appreciate it. When the soldier sees the battle from a distance it looks terrible to him. But when he gets into the fight and the bullets are flying around him, he is interested in what he is doing, and the battle don't look so terrible as it did from a distance. It is so with us: We have been notified that this time was coming, and now that it is upon us, our minds may be blinded so that we won't appreciate the fact that we are in the most perilous time the world has ever known. And we must be careful, while helping others that we don't get shaken

onto the wrong side.. We may be doing this pioneer work, and while doing it, we may backslide in a week's time and we must LOOK OUT,--we must continue the struggle. Everything will be going on splendidly and there will be a high spiritual state, and in a week we are at the other extreme, and we have to struggle back. And we have to struggle against tremendous odds,--and the Devil is working mightily to discourage us. One brother told me yesterday of complications arising, and the defections of this one and that one, and of terrible revelations coming to him by telegrams and letters,--something worse than I dare to tell you. You need not be surprised to see those whom you most depend upon drop right out, and we have got to stand, every one for himself. We must get our feet planted upon these principles so that we cannot be shaken.

Now I want to tell you one thing that has occurred to me as the only way to keep ourselves alive to the value of the work we are doing,--and that is, to work for somebody else. So long as we simply allow these facts and principles to be poured into us, it gets to be an old story or a familiar song and no longer arouses attention. But the moment we go out and apply these principles by helping up some one who is down, then we see the power of these principles, and they come back to us fresh and new as when they first came to us. When we first grasp the truth, how sweet it is; I don't know of anything so sweet as to find a new truth,--that is, if it is a valuable truth. But we must lose sight of the value of that truth if we don't make use of it; but if we make use of it our own delight in it and enjoyment of it is renovated by seeing the good it does to others when put in operation. Let us remember this, that our only hope of warming ourselves is by warming somebody else.. We must keep our lamps trimmed and burning,--and we must have oil in our

6/19/27

Fruits as I

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Fruit is a food so generally looked upon as a luxury and partaken of at all times that its dietetic value is largely overlooked. The average bill of fare seldom makes but little if any use of fruits save in the form of rich sauces or as an ingredient of pies. Fresh fruit is eaten between meals so commonly that it seems to be regarded much as candy and nuts seem to be, as a sort of chinking to fill in the intervals between breakfast and dinner, dinner and supper, supper and bed time having no connection whatever with the ^{food} supply at meal time. Just as much other food is considered necessary ^{to constitute a meal} as though no fruit were eaten between meals so that in reality the cost of the fruit supply is simply added to the cost of other foods and because of this people are wont to say that fruit is too expensive a luxury for daily use, while in truth it is not the use but the wrong use of fruit that is expensive. Were fruit used in ^{its} proper place at meal time as a substitute for some other food of similar nutritive value the cost

²
would probably not exceed the cost of
the food for which it was substituted
unless it were some especially expensive
~~or~~ unseasonable variety while without
doubt the exchange would be a most
beneficial one in many ways,

Fruits while, ^{with few exceptions} possessing no very
great proportion of nutritive food
elements, yet contain so many
essential acids and so large a
proportion of fluids mixed in just
the right way for nature is a
much better chemist than man
that they serve a most valuable
purpose in the vital economy
and when used in conjunction
with the grains we have
every element needed for the
proper sustenance of the body.
Fruits like grains are also so

³
universal in their growth throughout every quarter of the globe that there is seldom a time when an abundance of some sort can not be obtained.

In many countries Fruits constitute a large share of the dietary. In the south of Europe figs are largely depended upon for food for at least five months of the year.

The Arabs, ^{while} crossing the desert often live for weeks upon a handful of dates per day as their chief ration. It may be

stated however that the dates are probably not preserved in sugar as are those imported to this country.

When public games were first instituted in Greece the diet of athletes consisted of dried figs, nuts, soft cheese and a coarse bread.

4
The modern Greeks are a powerful
race and their food consists largely
of black bread, grapes, raisins and
figs. A gentleman visiting in Spain
says the Moorish porters who carry exceedingly
large loads live only on brown bread and
grapes. A ship loaded with barilla
from the Canary Island arrived in
Portland not long since. Four
strong Americans tried to lift one
of the masses of barilla but their
united strength was without avail
to move the bale which the captain
asserted had been brought to
the ship from the island ^{storehouse} by one
man, a native laborer, whose
only diet was fruit and coarse vege-
tables. In every nation a simple
diet is the food of the strong, healthy
and muscular people.

which is richest in albumen and sugar.
 Of all fruits the apple, ranks first
 in nutritive value as does the wheat
 among grains. It is also the fruit
 best adapted to all climates. A raw
 apple properly masticated ought
 to digest in $1\frac{1}{2}$ hrs. Of the differ-
 ent varieties of the apple the juiciest
 are said to be more digestible while
 the mealy varieties are the most
 nutritious. The apple ~~like~~ ^{as well as} all other
 fruits should be thoroughly masticated
 and taken into the stomach as insalivated
 pulp, to be readily digested. In case
 of poor digestion all fruits should
 be eaten with hard bread, never with
 vegetables and meats. Fat meats
 and other fats used in connection
 with fruits are most conducive to
 indigestion. Fruits and fats are
 sworn enemies they never do,
 affiliate well.

All⁶ fruits consist essentially of 2 parts
the cellulose structure containing the
juice and the juice itself. The latter
is water with a small proportion of fruit sugar
and vegetable acids. These acids are either
free or combined with potash salts in
the form of acid salts. They are mallic
citric, tartaric and pectic acids. The
last named is the jelly producing principle.

While the juice, as we commonly
find it is readily transformable for
use in the system the cellular structure
of the fruit is not always so easily
digested. In some fruits as the grape
and banana the cell walls are so delicate
as to be easily broken up but in water
melons and oranges the cells are coarser
and form a larger bulk of the fruit hence
less easily digested. As a rule
other points being equal the fruits
which yield the richest and largest

quantity of juice and also possess a cellular frame work the least perceptible on mastication, are the most readily digested, a certain amount of waste matter is an advantage to give bulk to our food; but persons with weak stomachs who can not eat certain kinds of fruit are often able to digest the juice when taken alone.

Unripe fruits differ from ripe fruit in that they contain starch which during the ripening is changed into sugar, and generally some proportion of tannic acid which gives them their astringency. Raw starch in any form is indigestible hence unripe fruit

most fruits properly used aid digestion either directly or indirectly, and its free use in many diseases is considered of importance.

To serve its best purpose it should be eaten with out ~~the~~ ^a deluge of sugar or other condiments however.

It is a disputed question whether fruit should begin or end the meal, but it is generally conceded by

those who have given the matter attention, that fruit eaten at the beginning of a meal is itself the more readily digested and aids in the digestion of other foods since fruits like soups

have the property of stimulating the flow of the digestive juices. Much however must depend upon the kind of fruit eaten.

10 Oranges, grapes, melons and such ^{in general} especially juicy fruits are best as appetizers at the beginning of a meal while bananas and similar fruits ~~agree~~ better eaten in connection with other foods. It is often erroneously

asserted that fruit is used as dessert is apt to disagree ^{with digestion} ~~at which fruit has them~~ ^{indigestion} ~~at which fruit has them~~ ^{probably} ~~at which fruit has them~~ ^{does} ~~at which fruit has them~~ ^{does} but the difficulty is not that the fruit was unwholesome but that it like many another good thing was in bad company -

Any other form of dessert might be just as likely to prove injurious to digestion, under the same circumstances. For those people who regulate the rest of their bill of fare according to the principles of Hygiene a simple course of fruit as dessert is not only wholesome

11 But far less expensive in time and labor than many ~~less healthful~~ ~~detritus~~ ^{other} articles served as a diet

If intended to be eaten raw fruit should be in its perfection, perfectly sound and absolutely clean. That which has begun to decay should be rejected. Juice circulates through the tissues of fruits in much the same manner as blood circulates through animal tissues - though not so rapidly and freely. The circulation is sufficient, however, to convey to all parts the products of decomposition when only a small portion has undergone decay, and although serious results do not always follow the use of such fruit, it certainly is not first class food.

Fruits like ~~currants~~ ^{currants} & cherries can be best washed by putting in a colander & dipping in and out of a pan of water.

12 There is room for much artistic display in the arrangement of fresh fruit for the table. A very pretty way to arrange ~~the~~ oranges for breakfast is to cut them, placing one on each persons plate as the table is prepared. Bananas & apples if used to begin a meal should be served with wafers.

For cooking fruits the utensils used should be granite or porcelain. Fruit cooked in tin not only loses much of its flavor but if the tin is of poor quality there is always danger that the acid of the fruit acting upon the metal will form a poisonous compound. - Cover the fruit also with a plate and not with a tin cover. Use silver knives for paring as steel blackens and discolours the fruit. Many fruits are more easily handled and can be pared better if divided before paring.

¹³
Cook fresh fruits in boiling water and
in general but a small amount is
required. If economy is a point
to be considered do not add sugar until
the fruit is done as sugar cooked
with an acid is converted into
glucose and it will require
nearly 2 as much sugar to
give the same sweetness to the
fruit if added before cooking
as it will if added when the
fruit is done. On the other hand
if the fruit is one which you
desire to keep whole the sugar
added to the will aid in this,
direction as it abstracts the juice
of the fruit, thus slightly
hardening it and prevents its
falling in pieces. Fruit in
cooking should not be allowed

14 to boil hard as hard boiling destroys
its flavors by excessive evaporation
such as ^{such as} ~~such as~~ ^{citrus} ~~citrus~~ ^{fruit} ~~fruit~~
~~Strong~~ flavors should be added to fruits
~~which~~ ^{as} ~~will~~ destroy their natural flavors
if any flavors are desired let it
be that of some other fruit in
addition to their own as of lemon
+ guava or pineapple or the ~~perfume~~ ^{perfume} of some
flower as of rose

Unripe fruit is improved by
making the cooking quite
lengthy as a sort of artificial
ripening. Many of the larger

fruits are best cooked by baking.
In cooking fruits by any method
care should be taken to cook
the same quality and size
together as far as possible

16. turning the fruit into a cloth bag and
The old fashioned preserves, jams, and
jellies in which an excessive
quantity of sugar is used with
the fruit are all methods of using
fruit which are not to be recommended.
Jellies are sometimes serviceable
but they can and should be prepared
with a much less amount of sugar
than is generally used. ~~Some fruits~~
~~like the apple~~ It is not the sugar
that makes the jelly but the pectose
in the fruit, some fruits as apples
and cranberries which possess a
large amount of pectose can
be made into ~~excellent~~ jelly
with no sugar whatever while
some fruits like peaches which
are largely deficient in pectose
will not make a firm jelly
with sugar