JOHN HARVEY KELLOGG (1352-1943)

LECTURES, SPEECHES, NOTES, AND
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FOOD

THE GOOD HEALTH CAFETERIA

"As a man eateth, so he is" - Old Proverb

We met a man the other day who had a bad breath and a blotched skin, and complained of being tired all the time. We asked him, "What do you eat?"

"Oh," he said, "I hardly have time to eat. When I get very hungry, I rush into a restaurant and I say, "Gimme sumthin' quick. And if they bring me a chop, I eat it; if it's yellow dog, I eat that; anything that comes along."

And that was why he had "that tired feeling," and a breath that suggested the aroma of a dead rat.

EATING FOR HEALTH AND EFFICIENCY

The GOOD HEALTH CAFETERIA aims to meet the requirements of the man who recognizes the relation of right living to good health and physical and mental efficiency.

Here are some of the special advantages offered by the GOOD HEALTH CAFETERIA:

Clean, wholesome food.

Choice Dairy Products

We use only "certified" milk and choicest butter and eggs.

Fruits and Vegetables

Our fruits and vegetables are the very best and freshest that the market affords.

Specially Trained Cooks

Our foods are prepared by specially trained and carefully supervised chefs and cooks, and served daintily and invitingly.

Battle Creek Health Foods

The famous health foods originated by Dr. Kellogg and prepared by the Battle Creek Food Company are made a prominent feature of our menus.

Special care is taken to provide on every bill of fare foods known to be of highest value for correcting slow digestion and other digestive troubles.

No foods scientifically known to be unwholesome appear on our bill of fare.

Extraordinary care is taken to maintain the highest standards in cleanliness and sanitation. Every employee is required to have a health certificate. All market fruits and vegetables are given an antiseptic bath before cooking -

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Our patrons are earnestly invited to offer any criticisms or suggestions that may occur to them. It is the determination of the management to conduct the GOOD HEALTH CAFETERIA in such a manner as to merit your approval and command your patronage .

DIRECTIONS FOR PREPARING SOY ACIDOPHILUS MILK AT HOME.

After many months of experimentation we have succeeded in perfecting a method by which soy acidophilus milk may be prepared at home. The preparation of cultures is a laboratory problem and in the case of the soy acidophilus milk it is particularly difficult for the reason that the growth of contaminating germs is stimulated equally as much as that of the lactobacillus acidophilus. Pure cultures are absolutely necessary as otherwise the product may not only be useless but positively detrimental. Safe and efficient cultures can be prepared only in a well equipped laboratory by a skilled expert who has had special training in the culture of the lactobacillus acidophilus and has become familiar with its habits of growth.

We are now able to supply the necessary materials for making soy acidophilus milk at home so preparedthat it is only necessary to put them together under conditions which any kitchen will supply to secure an excellent and highly efficient product. The essentials are:

1. A culture of high potency, fresh from our laboratories. A new culture is sent by parcel post weekly.

2. A supply of concentrated and thoroughly sterilized soy milk prepared by our special process. This is put up in tin cans containing 10 ounces, each sufficient to make one quart of acidophilus milk.

3. A two quart glass fruit jar is thoroughly washed and made sterile by baking or by rinsing with boiling water.

<u>Making the cultured milk:</u>

It is a good plan to prepare two quarts at a time as the culture improves in flavor and potency by aging a day or two. Proceed as follows: Bring the material to be used together on a table in a clean corner of the kitchen, avoiding air currents which may carry dust laden with contaminating germs.

Open two cans of the condensed milk, using a can opener which has been carefully washed and passed through a flame or dipped in boiling water. The end of the can also should be dipped in boiling water before opening. Pour the milk into the fruit jar and add hot water which has been boiled, sufficient to fill the jar within an inch and a half of the top. Close tightly and allow to stand until cool enough so that the hand may be held against the jar without inconvenience from the heat, which should be about blood temperature or not higher than 110° F.

Now add two tablespoonfuls of the culture.

(Over)

Close the jar tightly and mix well by turning up-side-down and shaking.

Place in a paper bag or wrap tightly with a newspaper and then wrap in a towel and place in a larger paper bag or wrap tightly in a newspaper. In cold weather, wrap in a blanket and put in a warm (not hot) place, but in ordinary summer weather place in a room kept at usual living room temperature for 24 to 36 hours.

Keeping the cultured milk:

Do not put in refrigerator. A temperature below 50° F. lessens the bacteria count and hence its efficiency. The culture keeps best at a living room temperature or about 70° F.

The soy acidophilus milk also keeps best at ordinary living room temperature.

Natures Provision The Economical Plan

by

J. H. Kellogg, M. D.

There is somewhere about one and a half billion people on this earth and it is astonishing to see what a small proportion of them are meat eaters to any extent at all. For example, there are forty millions of people in Japan. They are almost altogether non-flesh eaters. If they eat meat at all, it is merely as flavor for the insipid foods which constitute their principal dietary, such as rice which has the least flavor of almost any food. Then there are the 400,000,000's of China. Meat eating is almost unknown in China. There is a very good reason why the people of China do not eat meat, and that is they cannot get it. We are not saying they would not be meat eaters if they could get the meat to eat, but they cannot get it to eat, and the time is not so very far ahead when the average citizen of the United States will have just as hard a time to get meat as the Chinaman does at the present time and for the very same reason. The country will be so thickly populated that it will be impossible to feed the so-called food animals in sufficient numbers to supply meat at anything like the present rate of man. One of the very best evidences of this statement is to be found in the present situation in Germany. Germany is surrounded by hostile nations. England has undertaken to starve Germany out. For fifty years at least, Germany has been largely dependent upon food supplies from North America, South America, Russia and other countries. At the present time meat supplies are cut off. As a result of this the German people are at their wits end to know where they are going to get enough to eat, and naturally this has led to a very careful study of the whole question

of the economics of food by the German Government. There has recently appeared a book of 200 pages published last December by the leading scientific men of Germany,-- Prof. Rubner, the greatest living authority on the subject of food and Prof. Zuntz perhaps stands next as the second greatest living authority on the subject of food. These two men have made most extended experiments on this subject. The writer was in the laboratory of Prof. Zuntz of Berlin some three years ago. One of the things we noticed there was a large cage constructed so that it could be made absolutely air tight, and in this cage was a tread mill and on the tread mill was an ox working away for all he was worth, simply assisting Prof. Zuntz to perform an experiment. The ox was corked up there like the contents of a bottle with the cork put in tight, so that not a particle of outside air could get in there but the air the ox was breathing was being continually pumped out purified and pumped back again and a careful note was being made of the exact amount of oxygen the ox consumed and the exact amount of heat thrown off into the air by the ox, and the exact amount of work the ox was doing. Great care was taken to observe the amount of food the ox ate. He was carefully weighed from time to time and his food was analyzed and weighted so the amount of energy that was gotten out of the food eaten by the ox was determined with the same accuracy with which a chemist would determine the contents of a piece of ore or by which any other scientific problem would be solved. Within the last fifty years dietetic has become a science. With the exception of the investigations made by Prof. Pawlow the german scientists have done more to put the question of nutrition upon a sound and scientific basis than all the rest of the world together. They have in their book placed before

the German people the exact situation and shown them that starvation is staring them in the face, if they do not change their ways. The first thing they find is that the German people, as a whole, are eating fifty per cent more food than they need to eat; fifty per cent, more food than they ought to eat, so they have said to the German people,"you must stop wasting so much food. The rich must cease eating luxuriously. All must eat just the plain things that are absolutely needful for us." The next thing the peoples attention is called to is that they are supporting something like twenty-eight millions of hogs and ten million cattle. They find that they cannot afford to keep so many cattle and hogs so they are told to kill off nine million hogs at once because those hogs are eating up corn and the cattle are eating up rye and they need the rye and all the corn they have got. Professor Zuntz and Professor Rubner explain to the people that if a hog eats 100 pounds of corn under the most favorable conditions, when they undertake to get their corn back again by eating the hogs, they find that fifty per cent. or half the corn has somehow disappeared, that the hogs have used up half of that corn in living. Food is consumed under the most unfavorable circumstances when fed to an animal. As a matter of economy it is absolutely necessary to take our food at first hand as it comes from the vegetable kingdom and there is no other way to eat biologically. It is the only rational way. The economy of Nature, is for the vegetable to capture the sunshine and store up energy from it; then for the animal to eat this stored up sunshine and make use of it. We know what the manufacturer does. He sends out into the coal fields, digs out a lot of sunshine that is buried up

down there in the earth, brings it to the factory, puts it into his furnaces, burns it, converts water into steam and the steam runs an engine and the engine turns the dynamo or other machinery and we see this original sunshine shining out again in electric lights. The same sunshine that shown upon the earth thousands and thousands of years ago has been lying beneath the earths surface, stored there for our benefit, and we are now getting it out again so that we can have sunshine in the night as well as in the daytime. A million years ago this was not possible. The same thing is true of all machinery that is run. Windmills are run by this sunshine. The sun heats the air. It rises at the equator, travels up toward the north pole, then comes down and is thrown back toward the equator and makes wind. A man puts up a wheel in the course of the wind and the wind turns the wheel, thus it is the sunshine that turns all the windmill wheels. The sunshine operates the water so that it rises until it comes up to each an altitude that the water is cooled and condensed and falls down on the mountainside and collects in a brooklet which with other brooklets make a river. Man makes another kind of wheel and places it in the water and, as the current moves along, it turns that wheel, thus we see the sunshine turns all water wheels and steam wheels and wind wheels and all other sorts of wheels. The sunshine does all the work of the world. Food stores up sunshine and is an ingenious contrivance, if you please, by means of which animals can make use of sunshine for energy. An animal can work in the dark. A plant cannot to any great extent. Only a few kinds of plants grow in the dark and they have to grow at the expense of some other plant, if they grow. Sunshine is necessary for

plant growth. Sunshine furnishes energy out of which corn is made. Corn is simply stored energy and an animal is simply a machine for using an energy. A vegetable is a storehouse of energy while an animal is a mechanism for consuming energy. When we eat food it is fuel to the body and treated as fuel by the body. It produces heat and energy just exactly as when we put fuel into a locomotive, it is converted into energy and pulls a train. It is just as absurd for one animal to eat another as for one machine to burn another. What an absurd thing it would be to feed a big locomotive with little locomotives, or to feed a furnace for instance, with kerosene lamps. There might be some fuel in the lamp it is true, but the fuel it contained is but a small part of the whole thing. It is only what has been left there. There is the lamp beside the fuel. In the same manner when one eats a hog, there is something there besides fuel. There are ashes there and that is one objection to the eating of flesh, that there are ashes and cinders along with the fuel, waste substances that are not food but are unwholesome and more or less poisonous and consequently objectionable.

The finest people in Africa while they are not avowed vegetarians, are vegetarians from force of circumstances. In all the Congo region, the natives do not eat meat because they have been forbidden for years to carry fire arms and the animals have become so timid that it is impossible to capture them or to kill them with bows and arrows, clubs and spears as they used to do.
If they eat any meat at all, it is only very rarely.

Thus we have China with 400 millions; India with 300 millions;

Africa with 100 million, and 800 million people who are practically vegetarians. The natives of the islands of the sea, when discovered were living upon the fruits and vegetables that grew upon the earth. Capt. Cooke declared the men of the Sandwich islands were all Apollos and the women were all Venuses, that they had such perfect forms they were really beautiful to loop upon. These people have greatly degenerated since the islands was first discovered. They have acquired flesh-eating habits and diseases have multiplied among them.
Even in civilized lands, we find flesh eating is not universal by any means. The ordinary peasants of Italy practically eat no meat at all. Even in Germany there is not a large amount of meat eaten by the peasantry, very little in Spain, very little in France and even in England very little meat is eaten by the common people in the country. Some years ago while spending a few months in England we had the opportunity to become acquainted with the habits of the people who dwell in what is known as the "black country", and found that meat was almost entirely unused. Among the miners, where for instance, the women work and among the brick makers and the nail makers where the women work so much harder and better than the men that the men had to protest against women working in order to keep them from getting ahead of them. Those people never tasted meat more than three or four times a year and they are hardy strong vigorous people. The same thing is true in Ireland. The average Irishman does not eat meat but he lives on buttermilk, oatmeal and potatoes. He raises cattle to sell but does not eat meat himself. In Central America, there are vast multitudes of people that have very very little meat. The Tarahumara Indians are the most rapid and enduring

runners in the world and they never eat meat. They take a little parched corn bag and start off on a run across the mountains and go for days and days without stopping hardly except to rest at night. At one time an Indian sent on a journey of three hundred miles to carry a government message got to the end of the journey and got back again in exactly six days and he went over mountains that were so rough that even a donkey could not climb them. There was no regular path in many places and the only level places this man had to walk upon were the river beds which he forded. It was up and down over the hills and mountains all the way, three hundred miles and back again and he made it in six days and he carried all his food on his back, just a little parched corn.

When we look the world over, we find really a very small proportion of people who are actually meat eaters and everyone knows we can live without meat eating. Some three or four years ago during a beef strike 40,000 people in some of the large cities took a pledge that they would not eat any meat for six weeks or until the price came down. One thing struck us as very interesting. In all that experience there was not a single instance in which anybody suffered from lack of food, because they did not eat meat, and no serious complaint from anybody who did not eat meat, no poor workman fell down at his bench and could not go on with his work because he did not have beefsteak for dinner or for breakfast. Dr. Hall, the great Artic explorer, when the report of his travels was published in two great volumes by the United States Government, I read with interest to see how he lived up there. In telling of how he made his dash to the pole, he gave an account of all the details just what he took along, and what he ate as he stopped at certain stations. One day he ate his dinner setting on a block of ice with a hurricane gale blowing, forty miles an hour and a temperature 30 or 40° below zero.

And what do you think that dinner consisted of? Blubber, frozen seal meal, of course? Nothing of the sort. That dinner consisted of graham crackers. When his life was at stake, and he was making the supreme effect to reach the pole, the thing he took upon his sledges and depended upon to carry him to his goal was graham crackers. The best of the civilized people, the hardiest and the strongest do not eat meat. England gets her strength from the country; Ireland gets her strength from the country and the same thing is true of every other nation. The strength of the nation comes from the country. The town is where people degenerate. If it were not for the country continually reenforcing the life of the town, degeneracy of the human race would be so great that everybody would recognize it.

An increasing number of people are to be found in all these civilized countries who are abstaining from meat and finding they are better off without it than with it. One suggestion made by these eminent German scientist before mentioned who are advising the German people how they can live within themselves and defeat the attempt of England to starve them out and that is that they should cut out meats very largely. They are assured that it would even be an advantage to them. Beans, peas and other wholesome food of that sort are recommended as being complete or perfect substitutes for meat.

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Care of the Bowels.

By J. H. Kellogg, M.D.

NEGLECT of the bowels is one of the most common causes of ill health. The evils resulting from this neglect are multitudinous in number and far-reaching in character. The general prevalence of intestinal inactivity may be judged by the numberless remedies for sluggish bowels which are advertised and sold under the alluring titles of "Pleasant Purgative Pellets," "Fruit Laxatives," "Liver Tonics," etc., and the oceans of nauseating but laxative mineral water which are annually swallowed by the victims of this disorder.

One of the most potent causes of chronic inactivity of the bowels, commonly termed constipation, is neglecting to attend to the "call of nature" with punctual regularity. A healthy person of regular habits, taking his meals at regular hours, will experience the natural demand for the relief of the bowels at a regular hour each day. With some persons the bowels naturally move twice daily, but with the majority of persons the bowels will naturally incline to discharge their contents, consisting of the residue of the food and a large amount of excretory matter thrown off by the mucous membrane, each day within an hour or two after the morning meal. Many persons, through the press of business, or merely by the force of slovenly habit, neglect to attend to this physical duty promptly, and as a consequence the lower bowel gradually loses its normal sensibility, so that Nature's voice is silenced. As a result, the excretory substances which have been thrown off into the alimentary canal by the action of the mucous membrane, are retained to be absorbed into the system, and in addition, various noxious substances of an exceedingly poisonous character, which have been generated by the action of germs of various sorts upon the elements of the food, are also taken into the system. These poisons give rise to a variety of characteristic, and often most distressing, symptoms. ¶ One of the most common of these symptoms pertaining to inaction of the bowels is headache, which is simply a protest on the part of the nerve centers against the presence in the blood of the poisonous matters referred to. A bad taste in the mouth and an offensive breath are marked indications of the general condition of poisoning to which the body is subjected. Coated tongue and loss of appetite are also symptoms commonly present in this condition. Distention of the bowels with gas, colic pains, tenderness of the abdomen, and even peritonitis, or inflammation of the bowels, are not infrequent results of retaining within the alimentary canal poisonous substances which should have been promptly eliminated. It is no uncommon thing for a person whose bowels are habitually inactive to go about for days, in some instances for even a week or two, with the bowels loaded with fermenting and decomposing substances with which the whole body is being daily and hourly contaminated. Masses of fecal matter become impacted in the large intestine in such a manner as to completely block up the channel, and so hardened and imbedded as to be retained for an indefinite period, giving rise to most offensive and poisonous products, which are absorbed into the blood, and dispersed through every part of the body. The system of a person whose bowels are in such a condition is thoroughly poisoned throughout, and the marvel is not that he suffers a great variety of distressing symptoms, but that he is able to live at all in a condition of such profound poisoning.

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A mechanical result of an inactive state of the bowels and the forcible effort often required in relieving them of dried and hardened masses, is hemorrhoids, a condition commonly known as "piles." These painful excrescenses may be either "external" or "internal," or may consist of enlarged blood-vessels, thickened or vascular mucous membrane, or blood clots, due to rupture of vessels underneath the mucous membrane.

There is probably no morbid condition which has afforded so fertile a field for the patent-medicine vender as this. Thousands of unsuspecting people swallow daily the vile concoctions of nauseous drugs which are manufactured and sold under the most alluring and innocent titles. Thousands of others are equally dependent upon scientifically compounded pills or mixtures, while a still larger multitude resort to the use of laxative mineral waters, the properties of which are commonly due to the salts of soda or magnesia which they contain.

While the various drugs and nostrums thus swallowed are variable in character as regards harmfulness, it cannot be denied that the use of any or all stimulants is in some degree to be deprecated. "Laxatives," "tonics," "liver pills," etc., are all so many different kinds of whips, by means of which the bowels are caused to do more work than they are really able to do. The natural result of this excessive stimulation is to produce obstinate and aggravated forms of the various conditions which the remedies were taken to relieve. One of the most obstinate cases of constipation which we have ever met was the case of an elderly man who had been accustomed to the use of laxatives during almost his entire life, having begun their employment when a very young boy. According to his statement, it was the custom in his father's family for each member to receive every Saturday from the mother's hand a liberal dose of salts. Each member of the family, from the oldest to the youngest, was apportioned his proper dose, which as age advanced was gradually increased, until in the case of the old gentleman referred to, almost any quantity of "salts" could be swallowed without any apparent effect. We have met many instances in which the bowels under this regime of stimulation had become so obtuse to the influences of things of this sort that the most powerful and drastic drugs were taken without effect. A patient who came under our professional care a few years ago had been through the whole gamut of purgatives, from castor-oil to croton-oil, and from figs and licorice powder to epsom salts, until all had failed, and as a last resort a table-spoonful of pure mustard seed was swallowed regularly every morning as the only means by which the much abused bowels could be induced to do their duty.

Inactivity of the bowels, resulting either from neglect or abuse, is such an extremely common condition that a few suggestions as to proper treatment may prove useful ~~in this connection~~. First of all, as a remedy which strikes at the root of the evil, must be mentioned water-drinking. Deficient secretion is one of the conditions commonly present in chronic constipation. There is usually deficient activity of the secretory glands and the mucous membrane lining the large and small intestine, and a sluggish condition of the liver. The liberal use of water aids both intestinal secretion and liver activity. The bile is a natural laxative. Water drinking, by increasing the amount of bile, not only dilutes the contents of the intestines, but stimulates their peristaltic movements. The amount of water to

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be taken daily will depend upon the quantity and quality of the food taken. ~~If the food consists largely~~ of such liquids as milk, soups, ~~gruels~~, etc., with a liberal allowance ~~of fruit~~, little water need be taken in ~~addition to that taken at the meals~~; but the majority of persons would be benefited by taking water in quantities of half a pint to a pint, three or four times daily. As a rule, water is best taken warm or hot, but occasionally, activity of the bowels is more readily stimulated by a glass of cold water taken just before breakfast.

Those who take a liberal ~~amount~~ allowance of fruit at meals will not need as much fluid between meals;

The abundant use of fruit, the use of whole grain preparations such as graham flour, whole wheat, oatmeal, etc., and the use of peas, beans, and other vegetables, when they are readily digested, are direct means of combating this unpleasant condition.

In the line of treatment, a most valuable remedy is the old-fashioned *umschlag*, a remedy devised by Priessnitz, the water-cure doctor of Graefanberg, who excited so much attention in the early part of the present century. The *umschlag* consists of a wet cloth worn about the bowels during the night. A coarse towel about a yard in length and wrung out of cold water just dry enough so that it will not drip, and then covered with dry flannel, is all that is necessary. In the majority of cases an eruption appears on the skin after the bandage has been worn for some days or weeks. The bandage should be removed for a time, when this occurs, to give the skin opportunity to heal. The *umschlag* combats inactivity of the bowels by promoting the action of the secretory glands of the intestines. Another measure of value is exercise, both active and passive. Walking, horseback-riding, gymnasium practice, are all excellent means of combating intestinal inactivity. Exercise is useful not only as a means of directly stimulating activity of the bowels, but through its influence upon respiration, which is always increased by exercise, both in respect to the number and the depth of the respiratory movements. The vigorous action of the diaphragm induced by exercise also aids the liver, promoting the secretion of bile, and thus stimulating peristaltic movements.

Vigorous beating of the bowels either with the closed hands or by means of rubber balls furnished with handles, as in the so-called muscle beater, is a form of passive exercise which is often found of great value in cases of this kind. Not many years ago an enterprising charlatan of New York City made a fortune by publishing to the world the fact that he had discovered a remedy for constipation. His patients, after being put under a solemn vow not to reveal the secret, were instructed to knead or beat the bowels for ten or fifteen minutes three times daily. A large number of cures were effected by this simple means.

Another quack ~~has~~ recently received considerable notoriety by advertising a sovereign remedy for most of the ills to which flesh is heir, which ~~is~~ disclosed ~~on the payment of~~ the cure for five dollars. The so-called secret ~~is~~ found to be nothing more nor less than the flushing of the bowels, for the purpose of carrying off the poisonous fecal matters accumulated, and which are to be found in nearly every case of chronic constipation. Flushing is simply a large enema of warm water taken with the body in such a position that the head is lower than the hips, so that the water by gravity is made to force its way into the upper part of the colon, thus dislodging accumulations which are not reached by other methods. The amount of water required is from two to five pints. It should be borne in mind that the habitual use of enemas in any

he was willing to pay

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form is almost as pernicious as the use of drastic drugs, and many times the final result is to destroy the normal sensibility of the lower bowel, so that the enema or other laxative medicine becomes a permanent necessity. To obviate this difficulty, if the enema has been used for some time for the purpose of emptying the bowel thoroughly, the temperature of the water should be gradually lowered and the quantity decreased, until a small quantity of cold water will produce the same effect. Sometimes, it may be necessary to add a small quantity of glycerine, about one part in four, or a little salt to increase the stimulating effects of the injection when but a small quantity is used.

It is safe to say that proper care of the bowels, heeding promptly the slightest suggestion when there is a desire for relief, is one of the most efficient means of maintaining the body in good health. Sedentary persons, which includes most women of civilized countries, are particularly apt to suffer from inactivity or irregularity of the bowels. If all who suffer in this way would correct their habits, how great an army of patent medicine makers and venders, and itinerant quacks who travel about as "pile doctors," "orificial surgeons," etc., would soon starve to death for want of patronage, or be obliged to turn their attention to some more reputable business. Persons who have been habitually constipated for a long time should adopt a regular hour for attending to the relief of the bowels, and make an effort to secure a natural movement at that time, whether any inclination for so doing is felt or not. Then adopt such aids as may be necessary, and when the habit of inactivity is broken, gradually lay aside the artificial aids employed, until matters become established upon a natural basis.

613.21

APPETIZING FOOD.

The importance of a nourishing diet to retain the strength and build up the wasted system is well understood. People always feel a great anxiety to have their sick friends eat well. As a rule, with chronic invalids, it is not so much what to get as how to serve it. And right here is where nine out of ten make their mistakes. Very often a scene something like this occurs: The anxious mother bends over her idolized daughter, and pleadingly asks, "Mary, dear, can't you think of something you can eat?"

"No, mother," will be the almost impatient answer. "I'm sick of eating; I don't want anything.#

"But , darling," the mother will commence again, "Dr. Brown says you positively must eat. Can't you eat a little soft toast, or a poached egg?"

"No-no:" moans the sick girl, tossing restlessly on her pillow, wearied with the discussion, and nauseated at the very thought of food.

"Won't you have some panada then, or gruel? Or would you eat a bit of broiled steak, or drink some chicken broth? Coukdn't you eat some jelly or grapes. "

Still the answer is the same impatient "no", and after mentioning a dozen other things, none of which are wanted, the disheartened mother leaves her, and spends the next hour concocting sundry delicacies. The dinner cooked, the mother brings in a great tray loaded with enough good things to satisfy the appetite of a harvest hand, and is dissapointed to find that the dear one will

scarcely touch a mouthful of it all.

If, instead of this course, the sick girl had not been reminded of the dinner hour, or asked to name some dish she would like- for those who have been long sixk weary of food by merely thinking and talking about it- and a simple dish or two had been prepared and deftly served, she would have eaten it with a relish. There was once a patient with great emaciation and nausea at the sight of food, whose case was considered hopeless by her physicians An experienced nurse soon had her eating heartily, and on the high road toward recovery by strictly observing the following rules:

1.- The patient was never asked if she were hungry, or importuned to eat,

2.- But two or three dishes were prepared at a time, and no two meals in the week were the same.

3.- The food was seasoned and prepared with great care, and as carefully taken up, that there might be no loose crumbs, ragged edges or spilled drops anywhere.

4.- The quantity of food was small, that its bulk might not satiate the appetite of the invalid before she commenced eating.

5.- The tray was just large enough to hold the necessary dishes, and these were the smallest, prettiest and daintiest in the house, the napkin snow-white and freshly laundered, and the glass and silver polished until they shone.

6.- At mealtime the patient's hands and lips were bathed with a wet sponge and dried on a soft towel, and her food brought in immediately afterward. As soon as her meal was finished the tray was removed.

These minutia seem unimportant, but in reality they were the

summing up of years of experience. Well persons rarely realize the disgust a sick person feels over carelessly served meal. Through a morbid fear of being considered "babyish," invalids will rarely speak of these things, and sometimes will long for hours for something to eat "that looks good," and yet never sat a word.

Good Housekeeping August I892

613.2

EVERY DAY DISHES.

Some one has said that life to the average man is but a series of incidents between meals. It is often scarcely more than this to the average woman who serves her household as caterer and cook while the question of what to provide for these same meals if frequently an ever present and perplexing one. If meal getting were only an occasional occurrence said a housekeeper the other day the question would be easier solved, but it is the never ceasing round of every day dishes that must be provided, seasonable palatable and yest within the bounds of economy that taxes ones ingenuity and patience, until one is tempted to wish life could be as well sustained without eating. Doubtless there are many housekeepers in whose hearts her sentiments find a responsive echo, but since no such provision has been made and one must eat to live , it may perhaps be interesting for us to investigate some of the ways and means whereby meal getting may be made less irksome and laborious. We shall need to begin with these same every day dishes, since it is from them that the material is out of which are manufactured the brains which must solve lifes intricate problems, the strength and sinews which must bear lifes burdens and carry forward the worlds work.

They are in fact the foundation upon which health and much of lifes success and happiness are builded, and that they should be of a character to be productive of the very best building material is a matter of the utmost importance. The fitness of a food for this purpose depends upon its nutritive value, its digestibility, its palatableness and its adaptability to the needs of the user.

These essential points we shall endeavor to consider in our study of the dishes to be used upon our daily bills of fare. To aid us in this we have here a table, compiled from the most reliable scientific authorities both in this country and in Europe, giving an analysis of many of the most common foods in use showing the kind and amount of the digestible food elements composing each. These food elements are for convenience generally classified according to their chemical composition into three classes, Proted or nitrogenous elements which includes albumen, gluten, and allied substances , Carbonaceous elements including starch, sugar and fats and inorganic or mineral elements.

Each of these different classes of elements have a special particular work to perform in the maintenance of health so it is especially necessary that our food should contain some of each kind. It is likewise essential that these elements particularly the nitrogenous and carbonaceous principles, should be supplied the system in certain definite proportions. More of the carbonaceous than of the nitrogenous elements are needed. One part nitrogenous material to every six parts carbonaceous is a very good proportion. When a food is selected which contains an excess of the nitrogenous elements its use should be supplemented by other foods which will supply the lacking carbonaceous material and vice versa thus making of the two substances a properly proportioned food since an excess of either class is not desirable and in case of the nitrogenous elements any considerable excess is not only undesirable but detrimental because unusable. If we carefully examine this table we shall find that of all foods those which approach most nearly the perfect standard as regards the proper amount and proportion

of the food elements are the grains and foods prepared from them. In point of nutritive value the grains might well be selected as standard dishes upon our daily bills of fare. When well prepared the grains are also exceedingly palatable and easily digested. Notwithstanding the important place these foods are fitted to hold in the dietary of man, aside from their use in the production of bread and an occasional dish of corn meal, rice or oatmeal the grains are seldom found among the dishes in common use in this country. In many other lands the grains form the staple diet of a large proportion of the people. The most muscular men in all Europe are said to be the Russian grenadiers and the Scottish Highlanders both of whom live chiefly upon grains the one upon rye the other upon oat. The use of this grain in the form of oatmeal porridge for breakfast in Scotch households is as inevitable as the meal itself save, perhaps on Sundays was well illustrated by the little boy who was overheard upon the streets asking "What day's the morn mither?"

Sabbath , laddie.

An will we hae twa to breakfast mither?

Aye, laddie, gue we're spared.

An gui we're no spared, will we hae parritch?

The strongest , most enduring races in ancient times were those whose diet was largely composed of grains . There can be no doubt that the more universal use of grains would exert a most salutary influence upon the condition of mankind at the present day. The great number of grain products to be found in market make it possible to employ a greater variety of this class of foods than almost any other so that there need be no sameness to clog the appetite.

I imagine one reason why the grains do not occupy a more frequent place upon our bills of fare is because their various products are not better known, only one or two varieties being ever purchased and of the continued use of these the family perhaps soon tires. Variety in the use of grains is quite as essential as variety in other foods, and as there is very little difference in the cost, of the various grain preparations, the average price being 5 cts per lb. it is just as economical to purchase one pound of ten different kinds as to purchase twn pounds of one kind . Undoubtedly the grain foods would be held in higher esteem were they more commonly well cooked. The cooking of grains is a very simple matter in itself but through lack of care or knowledge respecting the nature of the grain it is seldom properly done. The use of an improperly cooked grain is as detrimental to health as a properly cooked one is beneficial. A grain simply because it is a grain is by no means warranted to fulfil its true mission unless properly prepared.

For the cooking of grains a double boiler or steam cooker is the most desirable utensil. If one possesses neither of these a substitute for a double boiler may be improvised from two earthen crocks, one enough smaller so that it can be placed within the other and leave a space around for water. It may then be used upon the stove or within the oven. An ordinary kettle may be used but the difficulties to be encountered in order to prolong the cooking sufficiently and prevent burning makes it the least convenient utensil for this purpose.

The grains belong to a class of foods which have lost nearly all their moisture during their ripening, which necessitates a large

amount being supplied them in their preparation for the table but the different processes by which they are milled as also the different absorptive properties of the grains themselves makes it necessary that different quantities of fluid be used in cooking the different grains. The proportion of liquid for a given amount of grain when cooked in a double boiler is shown on this chart. You will notice this point of similarity, the rolled grains require 3 parts water to one of grains, the broken and pearled grains require four to five parts water while the meals and finer ground grains in general require four parts of liquid to one of grain. Although there are some exceptions to this as well as to most other rules. If an ordinary kettle be used for the cooking larger quantities of water will be needed as the evaporation is much more rapid in a single than in a double cooker. If a porridge instead of a mush is desired an additional amount , generally one cupful, will be required. In general boiling water is the liquid which serves the best purpose for cooking grains. A few of those most largely composed of starch are however better if cooked in milk or part milk to increase their alimentary value. If milk is to be used it should be remembered that it is more dense than water and a larger amount in proportion to the quantity of grain will be needed than when water is used. It is absolutely essential for the perfect cooking of grains that both the grains and the liquid be accurately measured with the same utensil or with two of equal size. Guess work is a most pernicious practice. The plan of putting on the liquid and adding enough grain to appear to be about right may occasionally produce good results but it will not invariably do so and the chances are that the good results will be so infre-

quent that a distaste for the grain will be created. Accuracy of measurement is one of th cardinal principles of good cookery and must be carefully adhered to if success is desired. Measure the liquid into the inner cup of the boiler, heat it to boiling then stir in slowly the carefully measured grain taking care to do it sufficiently slow so that the water shall not cease its boiling during the process. If you are cooking the granular rolled, cracked or whole grains they can be turned from the measure or dropped from the hand into the water. If the grain is a fine meal or flour an excellent way is to take from the water just before it begins to boil a sufficient quantit y to mix the meal to a smooth paste which can, when the water boils, be turned in slowly by degrees without checking the boiling. It may if preferred be sifted through the fingers into the water but requires much more care to prevent its being lumpy. From the time the grain is introduced into the water until it has become thickn d or set as it is termed it should be stirred constantly. When however it no longer settles to the bottom, but is of the same consistency throughout it requires no more stirring and the boiler may be placed in the outer part and left to cook until done, with no further attention what ever save to keep water in the outer boiler and a fire underneath it. The length of time required for the grain to set or become thickened will vary with the grain preparations. The flours and meals becoming thickened in a very few minutes while the whole grains need from ten to twenty minutes. An occasional stirring will do very well for the coarser grain products. If a steam cooker is used the grain as soon as set may be turned into a china dish suitable for use on the table and left to complete the cooking undisturbed.

Nearly all the grain preparations require a prolonged , slow cooking in order to thoroughly disintegrate their tissues and to aid in converting the starch into dextrine. The difference in digestibility between a grain cooked only a few moments and one properly prepared offers a sufficient reason why grains are sometimes thought to be unsuited to a persons needs, while the difference in taste is also quite noticeable. Even the so called steam cooked grains advertised to be lready for use in five or ten minutes require a much longer cooking to properly fit them for digestion. Such grains are steamed before grinding and afterwords treated with chemicals to soften their tissues, but the process does not so thoroughly alter their chemical nature as to make it possible to cook them ready for easy digestion in five or ten minutes although this short cooking may be sufficient to make them quite palatable. An insufficiently cooked grain, although it may be palatable is not in a condition to be readily acted upon by the digestive fluids and is in consequence left undigested to act as a mechanical irritant.

The prolonged cooking is a matter very little trouble however, when a double boiler or steam cooker is used. The only difficulty that needs to be met is the question of fuel the expense of which might prove considerable were a coal or wood fire kept expressly for this purpose but the managing housekeeper will be able to cook her grains at the same time with other foods so that no extra fuel will be needed, or she can if she chooses use a little lamp stove, which with ten cents worth of oil a week will cook all her grains with the very least possible trouble. There is no hot food with which we can supply our tables in summer which gives less

trouble to prepare and more satisfaction to eat than the grains cooked thus over an oil stove. There are so many varieties of the grains and so many ways in which each variety may be prepared, we may have a change as often as we like. To illustrate let me ennumerate some of the excellent dishes prepared from the grains, suitable for this season. Oatmeal mush, Oatmeal Blanc Mange, Oatmeal fruit mush, prepared by adding to well cooked oatmeal some nicely sliced strawberry apples. Mixed mush I I-2 rolled wheat with I-2 cup of coarse oatmeal, Oatmeal Porridge, Pear Wheat, plain, Pear Wheat with the addition of steamed raisins. Cracked Wheat plain, Cracked Wheat with blackberries. Rolled Wheat Plain, Rolled Wheat with chopped figs, Rolled Wheat with steamed apples, Boiled Wheat Plain, Boiled Wheat with raisins, Molded Wheat, with jelly, Farina plain, Farina with a fig sauce, Farina with banana, Graham Grits, plain, with the addition of steamed raisins, Plum Porridge, Graham Mush, Graham Mush with dates, Graham fruit mushes, blackberry, peac, apple, Rolled Rye, Rye Mush, Secale Flakes, Pearl Barley, Pearl Barley with raisins, Corn Meal, Hominy, Hominy Flakes, Parched Farinose, Rice, which by the way I consider is better to be steamed than cooked in any other manner. This is very easily done by first carefully washing a cupful and soak it in a cup ful of warm water for one hour, then add to it one and one half cups of milk or one and one fourth cups of warm water and steaming it for one hour. It may be cooked in any dish desirable for use on the table, and each grain will be perfect in appearance and at the same time tender and well done. It may be served plain, with the addition of raisins, with a fig sauce prepared the same as for farina, with a tomato sauce, an egg sauce, or with lemon syrup. It is likewise

excellent served with steamed apples, canned or sliced peaches, or shreded oranges . A very palatable dish may be prepared by browning the rice until lightly tinged and then steaming. Only two parts of water will be required, and no previous soaking will be needed, as the parching aids the cooking process , and renders the rice more easily digested than when not browned. Counting our list we find we have forty no two alike nutritious, seasonable, easily prepared every day dishes which I think the majority of people would pronounce exceedingly palatable, and which I know from experience housekeepers would find far more easy of preparation than many of those in common use. They will however be found more suitable to use as a staple article of diet if served with little or no sugar. Sugar is not needed with grains to increase their alimentary value. The starch which constitutes a large proportion of their food elements must itself be converted into sugar by the digestive processes before assimilation, hence the addition of cane sugar only increases the burden of the digestive organs for the pleasure of the palate. The Asiatics, who subsist largely upon rice, use no sugar upon it and why should it be considered requisite for the enjoyment of wheat, rye, oatmeal, barley and other grains any more than it is for our enjoyment of bread or other articles made from these same grains. The continued use of sugar upon grains has a tendency to clog the appetite, just as the constant use of cake or sweetened bread in the place of ordinary bread, would do. Plenty of nice sweet cream or when preferred, fruit juices is a sufficient dressing and there are few persons, who after a short trial do not come to enjoy the grains for their own sakes instead of for the sugar used on them. It is also

desirable to eat the grains in connection with some hard food, in order to insure their perfect insalivation. Because they are made soft by the process of cooking and do not require mastication to divide them the first process of digestion is too generally overlooked. It must be remembered that grains are largely composed of starch and that starch must be mixed with the saliva or it will remain undigested in the stomach. since the gastric juice only digests the nitrogenous elements, hence the necessity of retaining the food in the mouth until thoroughly insalivated. We are such creatures of habit that this is more easily accomplished if it is made a necessity as by the use of some hard bread with the grains, Whole Wheat wafers nicely toasted are excellent for this purpose. Break them in small pieces over each individual dish before pouring on the cream. In this way a morsel of the hard food may be taken with each spoonful of grains. The combination of foods thus secured is most pleasing and many who have become accustomed to the use of the grains properly cooked and thus served would as soon think of dispensing with a meal altogether as to dispense with their grains.

Another food in which there is stored most valuable and desirable possibilities for every day dishes is macaroni, and although an article not in very common use we trust there are few persons quite as ignorant of its good qualities as was the cook who when asked by her mistress if the macaroni had not come from the grocers, replied "Yes mum, but oi sint it back, Every won of them leitle stems wuz impty." Macaroni is prepared from wheat, a hard semitransparent variety originally peculiar to Italy where macaroni is a food of national importance. The hard varieties of wheat are much richer in gluten and other nitrogenous elements than the

more soft and tender wheats. They are however not so easily grown in temperate climates. The wheat is first ground into a granular meal called semolina which is sold in this form as well as being made into macaroni. This semolina is first mixed to a dough by being thoroughly incorporated with boiling water, after being well kneaded it is placed in a strong metalic cylender the lower end of which is a perforated plate with holes the size of the article to be made from the dough. A powerful piston is then set to work to press the dough through these openings, below which revolving knives cut the tubes into proper lengths. It is then hung over rods to dry in heated apartments through which currents of air are driven. It is only the macaroni richest in gluten that can be thus dried , that made of poorer wheat is so largely composed of starch it would not bear its own weight. Poor macaroni has to be spread and dried slowly on a flat surface and in the drying splits and breaks. One of the distinguishing characteristics between spurious and good macaroni is the flattened mark which indicates that it was dried over a rod. Good macaroni has also a soft yellowish color, is rough, elastic, hard and breaks with a glassy fracture. In boiling it swells to double its first proportions without becoming pasty or sticky. In its dry form it can be kept indefinitely without spoiling and is a most convenient, economical and nutritious article of food. Poor macaroni is apt to be whiter in color and when cooked flattens and becomes pasty like starchy dough which in reality it is , it being the gluten in the pure macaroni which renders it so different from the spurious article. The dough made from semolina is prepared in other forms, the size and shape of the article after drying giving it its distinctive name, fine

threads and smaller tubes, constituting vermicelli and spagete, there are also many fanciful forms.

Macaroni and articles allied to it are largely used in other countries. The average daily diet of the Italian peasantry is a breakfast of about twenty boiled chestnuts and for dinner a plate-ful of macaroni; cooked out of doors over a charcoal fire kept alive by active work with a hand bellows, served with a dressing of tomato or cheese and eaten with the fingers. The Germans noodles are psome what similar to macaroni. The Chinese use an article made of rice which is termed rice macaroni. Macaroni is manufactured to some extent in this country but although it is often stamped with the Italian brand as far as my experience goes it is in general inferior to the imported article. Macaroni is easily prepared for the table. Cook it by droping into salted boiling water times as much water as macaroni will in general be required. From twenty minutes to one hours cooking will be needed according to the quality of the macaroni used. When well done, drain it in a sieve. It is very nice served with atomato sauce, an egg sauce or a cream sauce. An appetizing dish may be made by placing layers of the cooked macaroni in a pudding dish, alternately with layers of sliced boiled eggs, covering all with a cream sauce and browning in the oven, Alternate layers of granola and cooked macaroni, covered with a custard sauce, and baked makes another de-licious dish. In fact the ways in which this excellent food may be served makes of it a most desirable article for common use. We have here many samples of the foods we have recommended and which we shall be glad to have you test.

613.2

A NINETEENTH CENTURY DINNER.

First Course.

In all times and among all people dinner has been considered the chief meal of the day. Aside from its legitimate use that of appeasing the wants of hunger it has been made to serve various political and social ends in all ranks of life. To a well relished dinner has been attributed many a favorable change in the affairs of State while many an unfortunate event has been recorded as the result of an unwholesome or indigestible one. It is a well known fact, students of history that the dinner eaten by Napoleon the Great just before the battle of Leipsic proved so indigestible that as a result the monarchs brain became confused, his equilibrium unbalanced and thus the battle lost, and a new page opened in history. The dinners of Mohammed II kept the whole empire in a state of nervous excitement while one which King Philip failed to digest caused the revolt of the netherlands.

Although among the laboring classes the hour for dining has always been at midday in fashionable circles the time has been subject to many changes. In France in the I3th century nine oclock was the dinner hour. A century later ten was the appointed time. During the I5th and I6th centuries the hour was eleven from which it continued to advance until at the present time the fashionable dinner is partaken at any hour between 5 and 9 P. M. Whatever the custom regarding the other meals of the day it seems always to have been the universal desire to dine preeminently well . Tending toward this end the repast long ago out grew its first simple

estate and has for ages been made an occasion for excessive feasting and drinking. Although probably nowhere at the present time does there exist any such luxurious epicurian tendencies as were prevalent among some ancient nations it must be regretfully acknowledged that health is still made largely subservient to appetite and that far more time and strength than would be necessary with fewer and simpler dishes is expended in preparing food the chief merit of which is that it tastes good. Particularly is this true when guests are to be entertained in our homes. The prevalent custom of loading the table with a great number of viands upon such occasions is neither conducive to good health nor necessary to good cheer. A recent writer stigmatizes such a course as the barbarous practice of stuffing ones guests indicative of a crude state of civilization. Another aptly says the "Profusion of viands now heaped upon the table betrays poverty of the worst sort having nothing better to offer we offer victuals, and this we do with something of that complacent satisfied air with which some more northern tribes present their tidbits of whale and walrus.

Simplicity of diet should be a point of first consideration with all who have the getting and eating of dinners. Variety is needed that is variety from day to day but not too great a variety at one meal. It is a well known physiological fact that many foods which if partaken of alone or in harmonious combination are easily digested will often create a disturbance when eaten at the same meal with several different kinds of food.

The service of the dinner by course doubtless originated through the necessity of providing some way of managing the great variety of viands furnished for a single meal which in some periods often numbered upwards of one hundred dishes and instances are recorded where three hundred different articles of food were served at one dinner. Hours of time were devoted to feasting and when the overburdened stomachs could contain no more the feasters retired to a conveniently furnished adjoining room, the banquet hall where with the aid of a feather to tickle their throats their much abused stomachs were disgorged and they were in readiness to again devote themselves to the pleasures of the palate. One needs scarcely to be told that such volumptious living was most degenerating and degrading in its influence upon mankind for plain living and high thinking is an axiom suited alike to all times. In this nineteenth century of which progress is the watchword there ought to be constant advancement toward healthful living and one important step will have been taken when people are content to accept fewer courses of simple wholesome foods as their dinner bill of fare. What these courses and the food composing them should be must be determined somewhat by individual circumstances.

Soup is usually accorded the first place upon the dinner bill of fare, because as the saying is "it rejoices it to receive and digest other foods." in other words when taken hot at the beginning of a meal it stimulates the flow of the gastric juice thus serving as a sort of preparation for the dinner that is to follow. In general when soup is mentioned we are supposed to refer to some preparation of meat and bones. Such soups most people know how to prepare, so I have chosen to speak of a class

of soups not so generally well known , namely soups made from the leguminous seeds, grains and some vegetables without the previous preparation of a stock. In every particular such soups are equal in some things they surpass the soups prepared from meat and bones. In nutritive value they are vastly superior.

If we contrast the raw material which we may do by aid of this chart we shall find that the soup prepared from the grains and legumes rank much higher than meat in nutritive value and provided we require the same number of pounds of each to produce the same quantity of soup, which we shall have nearly three times as much nourishment in the soup prepared from grains and legumes as in the one prepared from meat and bones, providing also both retain after cooking the same amount of nutriment they possessed before but unfortunately during the long process required for making the stock the nutritive principles of the meat are largely deprived of all their qualities of organic nourishment, so that when ready for use a small quantity of grease some mineral salts and a certain quantity of gelatine sums up its total nutritive value and makes what one eminent authority has termed "starvation diet" and of which another says "common well water containing the average quantity of bacteria is more nourishing". The custom of adding grains and other foods substances to the stock of course increases its food value, so that many meat soups are more valuable foods than is beef stock pure and simple. Meat soups while containing so little valuable nutriment do contain more or less effete and waste matter which was on its way out of the vital domain of the animal when slaughtered and which is readily incorporated into the stock. Simple meat soups or broths also possess a stimulating property

chiefly due to creatine an element said to have almost the same chemical composition as caffeine the stimulating principle of coffee.

Soups prepared from the grains and legumes while possessed of a higher nutritive value present no such undesirable qualities. In the process of preparation the material which enters into the composition of such soups is so broken up and disintegrated that it is more easily digested than in any other form. In preparing soups from grains , legumes and vegetables the material employed needs first to be cooked in the ordinary manner using as small an amount of water as practicable. If the material be legumes or grains the cooking should be slow and prolonged. The purpose to be attained in the cooking of all foods is the partial digestion of the food elements and in general with these foods the more slowly , if continuous the cooking is done the more completely will this be brought about.

When the material is cooked the next step is to make it smooth throughout and to remove any skins or cellulose material it may contain. To do this we put it through a colander.- The kind of colander depends upon the material . Peas and beans require a fine colander. If very dry the material may be moistened with a little milk before being put through the colander. When the sifting is completed sufficient liquid should be added to make the material of about the consistency of rather thick cream. It should not be quite as thin as desired for the table if it is to be seasoned with cream as that will give it a little more thinness. The liquid to be used for the soup may be either milk or water as preferred .

With soups prepared from vegetables or starchy foods like rice, milk is best because it adds to the nutritive value of the soup. Most individuals will prefer the use of milk as the liquid for the foundation for most other soups but it is not so essential in point of nutritive value for the soups made from legumes as they are themselves among the most nutritious of foods as will be noted by reference to the chart. If the material be cold after adding the liquid it should be reheated and the salt and seasoning added. The quantity of salt to be used will depend somewhat upon the taste of the consumer but in general I-2 teaspoonful to the pint of soup will be ab ample supply. If any particular flavor as that of onion or celery is desired it may be imparted to the soup by adding to it a slice of onion or a stalk or two of celery allowing them to remain while the soup is reheating and removing with a fork before sending to the table. In this way a very delicate flavor will be obtained. Celery seed may be used instead of the stalks of celery but it is an undesirable plan since much of the celery seed in market is, like most other spices largely adulterated and frequently so with henbane a poisonous seed. When reheated add last of all a quantity of cream as seasoning one cup of thin cream to every quart or three pints of soup. To secure that perfect smoothness particularly desirable in most soup it should now be turned through a colander or chinese soup strainer , when it will be ready to serve. If it is desirable to have the soup particularly light and fine the cream may be whipped before adding it to the soup or the soup may be beaten a few moments with an egg beater just before serving. By this plan care will need to be taken that the soup is very hot to begin with as the beating will

cool it somewhat. When cream is not obtainable the well beaten yolk of an egg for every quart of soup answers for a very fair substitute with potato, rice and similar soups. It should not be added to the body of the soup but should be first well mingled with a cupful of the soup and then this stirred into the whole. The consistency of the soup when done should be about like this perfectly smooth throughout . If the soup when done is too thick it may be easily made thinner by adding more liquid. If too thin more of the solid ingredients must be added or a little cornstarch one tablespoonful to a quart of soup used to thicken it.

Whole grains, vermicelli and other similar foods to be used in soups should be first cooked separately and added to the soup just before serving. Soups affer a most economical way of making use of the left over fragments of vegetables and grains which are sure to accrue in every household. If properly preserved much of such left over material is quite as good as new for this purpose. It would be diff~~erent~~icult to give specific directions for making soups of fragments as those left over one day and in one family would be quite different from those on another day or in another family. The points to be remembered are to combine only such left over as harmonize in taste using as the base of the soup the most nutritious and least strongly falvored material as for example, left over oatmeal, potatoe may be taken for the base and a bit of turnip or celery would give a desirable flavor. Or a dish of left over beans might be taken as the base of the soup and a few spoonfuls of left over tomato, or corn supply the falvor. If small quantities of several harmonious materials be on hand as a little potato, rice, and cracked wheat they can together be used as the

base for a soup and some special flavor added. A little left over oatmeal or cracked wheat adds a desirable smoothness to almost all soups and when making a soup it is quite an advantage to have a little left over for that purpose. A general rule to be observed in making combination soups is to combine only such as harmonize in taste.

The soups prepared from grains and legumes are really foods instead of drinks as in the main meat soups are, and while meat soups are better to be served uncombined with soild food because of the fact that soid food taken with liquids like meat soup largely composed of water, must remain undigested in the stomach until the liquid is absorbed, the grain soups are better to be used with solid food in order that they be retained in the mouth for proper insalivation. On this account it is well to serve these soups with crontons prepared by cutting stale bread into small dice and browning it thoroughly in the oven A spoonful or two of these may be put in each plate; and the hot soup poured over them immediately before dinner is announced, or if preferred they may be left in small dishes near to be used by the partaker as desired.

This plan also serves the purpose of using the left over bits of bread. The alladdine oven is most excellent for their preparation but any stove oven may be utilized for the purpose. Another excellent thing about these soups is that the material may all be prepared for them in the early morning of hot summer days, and left in the refrigerator until near the dinner hour when it will simply require reheating and seasoning which if desired may be

accomplished over an oil stove and bo, you have a hot, seasonable and palatable soup with almost no discomfort and trouble. Then if for the other courses of your dinner you are satisfied to serve as meats cold roasts , or broiled meats with vegetables which prepared in the cool of the day simply require reheating, and grain cooked freshly over an oil stove, or previously cooked to be reheated , with some simple dessert your dinner will ample, wholesome, refreshing and you will be fresh and in a condition to enjoy it although mercury be away up in the mineties.

A NINETEENTH CENTURY DINNER.

Last Course.

It is the universal custom after the more substantial foods at dinner have been eaten to serve something different and more dainty in character as a finisher of the meal, or as is sometimes said something to "top off with". That phase topping off is very apt implying what is in generalthat when the stomach is already full something is put on top, and that something is far too often made of unwholesome material or of good material so combined as to make it unhealthful the chief merit of which is that it tastes good and can tempt an already satiated appetite to partake of just a little more. Such foods add nothing or little to the nutritive value of the meal while they do add much to the labor of the cook and require much time that might better be employed in other ways. Some one has estimated that the average New England housekeeper spends I-3 of her waking hours making pie and cake. Such women are what Mrs. Diaz calls slaves of the rolling pin and spoon and about which she has written so pertinently I think you will be interested in hearing what she says:-

If all these facts be true and who of us can wholly gain say them then indeed it seems important that the last course of dinner should be given a special share of consideration and the objectionable articles used as dessert replaced by those of a more wholesome character requiring less time and strength for preparation I doubt not the demand for pie and cake would be greatly lessened were our tables always furnished with good bread and plenty of fruit. It is not dessert per se which is objectionable but the

kind of dessert. There are many suitable and healthful desserts which if partaken before enpugh has already been eaten may serve an excellent purpose. The simplest of all these are nuts and fruit either raw or with a bill of fare with which they harmonize healthfully there can be no more economical and desirable dessert than the one which nature furnishes all ready for use with no outlay of time and strength on the part of the cook. It is not well to make use of some fruit as the last course of a dinner heavy with meats and fatty foods as with such , fruit never does affiliate, and has sometimes been regarded as a disturbing element. This however is a rank libel upon this delicious appetizer. It is not the fruit at all but the bad company it is found in which makes the mischief.

Fresh fruits to be used as dessert should be perfectly ripened, sound, and wholly clean. It is not enough to suppose because a fruit is fresh and sound that it is safe much fruit particularly that which grows upon low branches near the ground and such as has been transported far to market is liable to have disease germs on its surface and requires very thorough cleansing. If good fresh fruit is not obtainable very excellent desserts may be made from dried fruits or by cooking fresh fruits in various ways.

examples,

Prune dessert

Apple rose cream.

If greater variety of material is desired grains and grain products may be utilized, both alone and no connection with fruits or fruit juices.

Farina Blanc Mange

Pine apple tapioca.

Stewed fruit Pudding.

Bread to be used for dessert should be good bread, some cooks have the notion that poor bread , sour bread and any bread too poor to be used on the table will do for desserts.- Poor bread will not be converted into good material by disguising its taste with sugar and condiments.

Moldy bread should on no account be used. The nuts or oleaginous seeds also serve ab excellent purpose as dessert. Those foods are rich in nitrogenous material; They contain no starch but in its place contain fat- for this reason they should be minutely subdivided by mastication.

Those containing the least starch like pecans, almonds, filberts are the most wholesome.

Almonds roasted.

Custard desserts are more complex hence less easily digested Custards however, vary much in wholesomeness according to the manner in which they are baked. The egg which forms one constituent of all custards in order to be most wholesome must be lightly cooked. On this account a custard pudding should be cooked until set , no longer.

Cook in double dish. Custard cooked with one egg will be richer than one cooked in the ordinary way made with three eggs:-

Grains and other food substances used in custards requiring cooking should be first cooked before being made into custard.

Eggs for use in custards should be first class. These simple desserts will serve every purpose and save much time , strength, labor and health if however, an occasional pie or cake is desired. Even these articles may be simplified and prepared in a more wholesome manner than they usually are.

Cake may be made without baking powder or soda by the same method as unfermented batter breads, it can also be made very light and delicate with yeast,

A very simple pie
granola crust,

A crust prepared with very cold cream, and some granola meal in a cold room, and if on a marble slab not kneaded, just gathered lightly- rolled out quickly and baked, Linen pie.

TOXIC AND ANTITOXIC FOODS.

The modern discoveries in bacteriology and physiologic chemistry have thrown an enormous flood of light upon the subject of dietetics, a large portion of which unfortunately still remains very little utilized. It is the purpose of this chapter to present a brief summary of well authenticated facts which have a direct bearing upon practical dietetics.

proportions for perfect food. Being in themselves so nearly perfect foods and when properly prepared exceedingly wholesome and palatable it is to be wondered that they are not more generally used, yet scarcely one family in fifty make any use of the grains save in the form of flour or an occasional dish of rice or oatmeal. The variety to be found in grain preparations including pearl wheat, fluted wheat, whole wheat, farina, graham grits, germ meal, oatmeal, rolled oats, rolled rye, scale flakes, pearl barley, corn meal, ceraline flakes, hominy and rice renders it possible for one to make the grains the staple article of diet without their becoming at all monotonous.

Grains have been largely looked upon as a luxury to be used only as an occasional dish served with sugar, often an excessive quantity which almost or quite disguises their real natural flavors ~~and~~ of the grains renders them more or less apt to produce dyspepsia. Many people say the grain disagree with them but this will generally be found to be because they are not properly cooked or properly eaten. While sugar is not objectionable when used ~~moderately on grains, yet~~ I believe the more perfect way of serving grains is with cream only without sugar, ~~or salt~~. In this way, if the cooking is well done there is an agreeable natural flavor to the food which after a short trial the majority of people will come to enjoy and will then as soon think of dispensing with a meal altogether as to dispense with their grains. The question in the mind of the cook will not be what shall I

We have already mentioned the use of sugar upon grains which a small amount may not prove particularly objectionable

unwholesome articles are prepared from grains, - They all as I have said require prolonged cooking.

For cooking double boiler essentials. Substitute.

Liquid, soft water, milk, more, must be boiling.- must replenish with boiling water, cook continuously - stir none at all after grain has set.

* Grains present a much more inviting appearance if when they are properly softened by cooking they still retain their shape. Grains composed of cells, the cooking process softens their cell walls so that they burst easily upon being stirred when partially cooked so that the contents are liberated and the whole mass becomes pasty. They may be stirred when they first begin to cook without incurring this difficulty it is only after the grains become soft. If put into cold water the gluten soaks out to a more or less extent making the liquid pasty and gluey and the result is apt to be a raw, pasty taste even after the grain is done.

Grain should be cooked rapidly at first. When cooked in a double boiler, the inner cup should be set directly upon the stove at first, and allowed to cook rapidly for about ten minutes, stirring quite frequently. At the end of that time the grain will have ceased settling to the bottom and begin to t icken. Now to finish the process of cooking, set the cup inside the double boiler which should be filled with boiling water that the process of cooking may go on without any interruption. Put a cover over the top and set it where it will keep continuously cooking until

plan is not to be reccommended because the article produced by this process is not a wholesome one. Freshly baked fermented bread when a portion is rolled between the fingers forms into little balls or wads and does not crumble as does bread which is at least twelve hours old. When such new bread is eaten it forms into small compact masses upon which the digestive juices act with difficulty. We all know that a soluble substance like sugar or salt is more readily dissolved when in a fine powder than when in a compact mass, and the same is true of the action of the digestive fluids upon food. For this reason we avoid the use of new bread. Stale bread , however, contains the same amount of moisture although it is in a state of concealment as may be proven by putting a loaf of stale bread in some air tight receptacle and subjecting it to boiling heat for a short time, the ~~usual~~ result will be a loaf exactly like new bread in appearance.

If we cut slices from a stale loaf and subject it to a process of browning on both sides the heat while it drys and browns the surface draws the moisture out of concealment with in the slice between thetoasted surfaces and makes the interior of the slice exactly like newly baked bread and for that reason difficult of digestion, and if as is so frequently the case the slice is covered with butter so that the mass when it reaches the stomach is permeated with grease it forms one of the most unwholesome of foods. If however, the toasting or drying process ~~for a~~ is continued for a sufficient length of time the moisture will be entirely

dried out, the slice will be crisp thro ghout, the starch during the toasting process will have been converted into dextrine and the result of this process will be an article far more digestible than bread in any other form, bread may be thus toasted before an open fire but the process would be so long and laborious that it is far better to secure the same end by toasting the bread in a moderate oven. Such toast or zwieback as it is termed meaning twice baked bread may be prepared in considerable quantity at one time as one has bread to use and whenever one happens to have a fire, and can be kept in this condition for a long time if kept in some place where it will not absorb moisture. It is best prepared by putting the bread on perforated tins such as the rolls and biscuits are baked on but the oven grate will do nicely although less convenient to handle and a dripping pan can be made to answer very well. When one has the oven hot for baking other foods the same heat can be utilized as it begins to diminish for preparing zwieback. Care must be taken that the toast does not burn for once scorched it is spoiled. The bread also from which it is made should be good, whole~~some~~ wheat or graham bread is of course the best, but whether white or graham it should be good of its kind, for by no process can good toast be made of poor bread. There are those that appear to think that if bread is heavy or sour and unfit to eat in its ordinary form that it can be made into toast, but it certainly can not be made into good toast. Bread once sour will never be anything but sour bread no matter into what it is

converted. Its taste may be entirely disguised but it can not be made to serve the same purpose as good bread. There is a point of economy in toast making as it uses up the left over slices of bread, and does away ~~although~~ altogether with the problem of what to do with the stale bread. In a household where zwieback is prepared and croutons made not a crumb of bread need ever be wasted. Having prepared our zwieback we may make it into a variety of most delicious dishes by moistening it in cream and serving it with a dressing of fruit, or vegetables or some sort of a gravy. The possibilities in this direction are almost unlimited, and no one need ever tire of toast from having the same kind over and over each day.

Dried fruits may be used for a dressing, first cooking and then rubbing through a colander to make into a homeogenous mass. Canned fruits may be utilized,- Cream, milk and eggs, lentils, vegetable oysters, celery.

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thoroughly done. Slow cooking devel ps a finer flavor and softens the grain much more satisfactorily than rapid cooking.

Almost all the different grains require a different amount of water to cook them properly; according to the nature of the grain and the manner in which it has been milled also according to the condition desirable to attain. If a thin porridge is desired a larger amount of liquid; so I am going to give you a table which you can rely upon for the purpose. These measurements are all for use with a double boiler. If you cook the grains in any other utensil, you must use a larger proportion of water for the purpose.

Pearl barley requires four measures of water to one of barley and from four to six hours cooking.

Coarse hominy requires five measures of water to one of the hominy, and from six to ten hours cooking.

Fine hominy requires four measures of water to one of hominy and four to six hours cooking.

Coarse oatmeal requires four measures of water to one of oat meal and four to six hours cooking.

Rolled wheat requires three measures of water to one of rolled wheat, and may be cooked quite thoroughly in two hours.

Rolled barley requires the same proportion and the same length of cooking.

Rolled oats requires the same proportion of water, and will be cooked in one hour.

Rice requires three measures of liquid to one of rice. and should be cooked one hour.

Ceraline requires one measure of water to one of ceraline, and will cook in a half an hour.

Graham grits requires four measures of water to one of Graham grits and should cook from three to five hours.

Cracked wheat requires four and a half measures of water to one of the wheat and should cook three hours.

Whole wheat requires five parts of water to one of whole wheat, and should cook six hours.

Farina should cook one to six hours.

Stir these grains when first put to cook to keep them from sinking to the bottom. If you are making mush of the finer grain materials, say of Graham flour, you should reserve a portion of the water to moisten the flour with, else you will be likely to have a mass of lumps instead of a smooth mush. In making Graham mush it is impossible to give definite proportions from the fact that different brands of flour absorb larger or smaller quantities of water. One cup of Graham ~~mush~~ flour to one pint of water is the ordinary rule. In making a Graham mush it is almost necessary to make a trial of the kind of flour first that you may know how much it will absorb. The rule for making corn meal mush is one quart of boiling water, a pint of corn meal, and one tablespoonfull of flour moistened with a pint of milk. Stir this into the boiling water.

Cooking grains is a very simple process, but it is one requiring accurate measurements, - as much so as making bread or any other food.

Cooking rice, I think it is preferable to stea in a rather

flat dish over a kettle of boiling water. This allows it to spread out more, and it is not so thick as it would be in a double boiler. It is nice to cook rice in this way in the dish in which it is to be served. Take one cup of rice and one cup of warm water and a half a cup of milk - the rice of course to be thoroughly washed and cleaned before this. Let it stand and soak an hour. Next, add one cup of warm milk and a half a cup of warm water. The milk and the water together make three measures of liquid to one of rice. Put in a steamer over a kettle of water, and steam for just an hour. If it is steamed no longer than this , since hasty preparation will not suffice for a cereal it cannot be conveniently cooked in the morning for breakfast. This difficulty may be obviated by cooking it the day previous and then warming according to the following directions:-

As soon as the grain is sufficiently cooked it should be placed at once in the refrigerator or in some place where it will cool quickly as slow cooling might cause fermentation. If cooked in a porcelain-lined or pure granite-ware double boiler it may be left undisturbed, if uncovered. If cooked in tin or iron turn the grain into a large earthen or china dish. To heat in the morning, fill the outer boiler with boiling water, place the inner cup containing the grain therein and steam till thoroughly heated . No stirring will be necessary and if placed upon the stove when beginning the preparations for breakfast it will be ready for serving in good season.

I have already spoken of the use of sugar with grains but there is another point which needs attention in connection with the

1 pkt Okra seed 5c
1 " Double Curled Parsley 5c
1 " Summer Savory 5c
1 " Banana Melon 10c
1 " Kohl Rabi 10c
1 Ground Cherry 10c
1 Egg Plant 5c
1 Extra Curled Cress 5
1 Ox heart Carrot 5

John Lewis Childs
Floral Park
Queens Co. N. Y

loaves and set again to rise. By the other plan the bread is kneaded a second time after being well risen.

FERMENTED enough.-

A thin sponge is well fermented when it is foamy and effervescent through out like yeast, a thicker sponge when it has doubled its first bulk and is cracked over the top like crazed china, and bread in the loaf is well risen when it has doubled its first bulk.

KNEADING purpose.-

The purpose of kneading the bread is the thorough diffusion of the yeast throughout the dough unless this is well done there will be likely to be holes and caverns in the bread when baked. For the thorough diffusion of the yeast it is like wise important that the batter into which the yeast is introduced for sponge should be thoroughly beaten. Each little atom of flour should have its accompany yeast cell, throughout the whole mass.

Bread is s fficiently kneaded when it works clean of the board and when punched with the fist will rebound to its first shape like a rubber ball. Most bread will be better and diner crain if kneaded as soft as possible. Many people add large quantities of flour during the kneading process thinking it necessary to keep the dough from sticking. This is by no means necessary and is a bad practice since by this means too much flour is added. The secret of kneading without the use of much flour is to keep the dough continually in motion and to knead with the palms of the hand taking care not to indent the dough

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give amounts you will notice this part of similarity - most of the rolled grains - require- 3 parts water , The coarser grains require 4 and the meals- although there are some exceptions to the rule. It is absolytely essential for the perfect cooking of grains that both the grain and the liquid be accurately measured with the same utensil or with two of equal size- Guess work is exceedingly detrimental the plan of putting on the liquid and adding enough grain to appear to be about right may occasionally produce a good result but it will not invariably do so, and the chances are that the good results will be infrequent that a distaste for the food will be created. Accuracy of measurement is one of the cardinal principles of good cookery and must be adhered in all its details if success is desired.

The liquid to be used for the cooking of grains should in general be water, for some grains as farina and rice which are almost wholly composed of starch, milk or part milk is advantageous because it increases their nutritive value. The liquid used should almost invariably be actively boiling, and care should be taken in the introduction of the grain not to stop the boiling.

(latent heat

If milk is to be used it should be remembered that milk is more dense than water and a little larger amount of fluid is needed than when water is used. All the grains except those nearly or wholly composed of starch and the very fine meals require a prolonged slow cooking, why- to thoroughly disintegrate or break up their tissues for digestion and to aid in converting the starch into dexture. It is possible to cook grains in a short

time so they will be palatable, but not the most digestible . Even the so called steam cooked grains require the same prolonged cooking to make them perfectly wholesome. These steam cooked grains are simply grains that have been steamed before grinding and afterwards treated with chemicals, but the process through which they are put does not so change them that they can be cooked easy of digestion in five or ten minutes as is advertised.

Even the meals which may be cooked in a shorter period are rendered more digestible by longer cooking time table, insufficiently cooked grain is not easily digested and acts as any other mechanical irritant.

Somebody will doubtless object to the long cooking with the that the amount of fuel required to cook the grains so long costs more than the grains themselves. Doubtless this would be true were a coal fire or wood fire kept wholly for this purpose, but the managing housekeeper will be able to cook her grains right along with other foods so that no extra fire or fuel will be needed, and if she chooses she can have a little lamp stove, which will cost her not over $2.00 and which with ten cents worth of oil a week will cook all her grains with the very least possible trouble. There is no hot food with which we can supply our tables in summer which gives less trouble to prepare and more satisfaction to eat than the grains cooked thus over an oil stove. Another question will doubtless arrise in your minds , if we are to cook the grains so long how can we use them for breakfast.-

The problem is easily solved in several ways. The grains may be cooked the afternoon previous and as soon as done set aside where it will cool quickly. If cooked in a granite ware or porcelain double boiler it may be set away in that. In the morning place the inner cup in the outer filled with boiling water and cook until heated through out with out stirring. No additional water is required in the morning. In cooking the rolled grains no additional water will be required at any time for the very coarser grains a half cup additional will be needed. If the grain is not cooked in a double boiler turn into an earthen dish at night and steam in the morning. There are some grains and preparations of grains as I have already stated which may be sufficiently cooked in a short time, such are suitable for breakfast dishes- Cooked all night. Used with hot cream.

Coarse grains- Stirring.

Graham grits-

Fine Meal- water hot.-

Grains while needing to be properly cooked also require to be properly eaten, because they are already soft and require no mastication, people are apt to swallow them with out proper insalivation.

In order to be sure they are retained in the mouth sufficiently long to be properly insalivated it is well to eat them with some hard food as toasted wafers.

What shall be used as dressing? The majority of people offset the value of the grains as an article of diet by the excess of sugar, which they use on them which often aids to set up a fermentive process almost as soon as it reaches the stomach, and if the grain is not well cooked the tendency to fermentation is much greater. Then too the natural taste of the grain is wholly obliterated by the sugar which soon clogs the appetite. I can see no more reason for making use of sugar or grains as a constant accompaniment than to use always cake instead of bread which is made from the grains. I believe this use of sugar is a hindrance to a more common use of the grain and that if people would learn to like them for their own sakes and not for the sake of the sugar, they would soon become a staple article of diet, and the question in the minds of the housekeeper would be not what to get for a meal but what grain shall be taken as the base of the meal and what other articles shall be used as accessories. The grains as I have already stated being the most nutritious of all goods ought to be the first and staple food, around which all other articles upon the bill of fare are grouped. In making out a bill of fare choose first the grain and then decide what other foods will accord with it. As a dressing for the grain nice sweet cream, fruit juices and fruit sauces are excellent and unobjectionable. Break the toasted wafers over a dish of grains and pour the cream over it and eat while hot and I think there will be but few people who will not prefer it to the more common but less wholesome method of using grains after a few

trials. The use of fruits in connection with the grains is an excellent plan both as a dressing and a combination and some of the most delicious of dishes may be thus prepared as you will yourselves decide I am sure when you come to the practice lessons,- Fresh fruits , as sliced bananas, peaches, berries may be used byor dried fruits or raisins by stirring into the grains while hot just before serving- most fruits are best not cooked with the grains. If raisins or currants or figs are to be used they should be first steamed before adding.

Fruit juices and their fruit pulp may be used as the fluid for cooking some of the grain meals thus forming most delicious dishes. Most grains are best served hot but many of them may be molded and served cold if preferred for a change. I have said nothing of the cooking of rice thus far, as rice although a grain and when well cooked an easily digested one but is so largely composed of starch that it is not an especially nutirtous and needs to be used in connection with some other food containing the elements it lack. It is I think best cooked by steaming. Wash a cupful very thoroughly- soak in a cup of warm water for one hour add a cup and a half of warm water or a cup of milk and a half cup of water and cook for just one hour.

after the skins are removed for a time before cooking as many cooks are in the habit of doing. Of course these facts have to relation to matters in themselves small and where people use an abundance of fruits and grains which contain the numeral and albuminous elements no very great harm would result from losing the albuminous and mineral elements of the potato, but when other foods containing the same elements are not used as in many families they are not it is important to save and use all that is found in the potato.

The very best way in which all these desirable results can be brought about in preparing the potato for food is by baking. but other ways are often more convenient.

Potatoes for baking should be ~~not only~~ both washed ~~but~~ and wiped before being put into the oven.

The sweet potato which is similar to the irish potato in composition is best baked also. In selecting these potatoes too great care can not be observed to remove the dry portion at each end and all discolored portions with all branchlets.

Potato with Celery.- Pare and slice the potatoes and put them into a stew pan with two or three tablespoonfuls of minced celery, taking the white part of the celery and chopping it fine with a chopping knife. Cover the whole with milk enough to cook and prevent burning. Stew until tender, and season with cream and salt.

Turnip.- Its nutritive value is very low, much lower than that of the potato; but the ruta baga or Swedish turnip is more nutritive than the white turnip. It is however, stronger flavored and people do not like it so well. The turnip contains no starch, but instead a gellatinous substance called pectose. This is turned into vegetable jelly in boiling. The white lining of the turnip inside the skin is of a bitter flavor, consequently it is important that the turnip should be pared very thickly. If it is necessary to cup a turnip, it should be cut across the grain. It should be cooked the same as a potato, in as small an amount of water as possible without burning. If there is anything which is disagreeable, it is burned turnip. As a protection against burning,. I find it a very nice plan to invert a saucer in the bottom of the kettle which keeps the vegetable from touching the bottom at all. After boiling tender, mash the turnips for the table.

Before closing I wish to emphasize the fact that while vegetables are most excellent are important foods they should not be relied upon to as a staple article of diet. I have seen much harm resulting from an attempt to leave off meat, butter etc and supply their place with vegetables. That is where very many people make mistakes, they cook the same bill of fare they were accustomed to when using meats simply leaving off the meat and preparing nothing to take its place. Meat contains the nitrogenous elements in excess and if we leave it off we must use grains, legumes or

nuts to supply the same material.

While vegetable excellent in their place they should not be expected to take the place of other foods - we must have requisite amount of each food element and if we do not get it in one way we must in another.

Gluten — One exception
no rule without some exceptions
it can be prepared into a
gruel on short notice. Gluten
is the nitrogenous element
of wheat. The starch has been
separated out — by washing
the gluten then bakes and grind

at certain kinds of food are digested in the stomach and others in e intestines. If we are preparing gruel for a patient that is suf-ring from stomach trouble, we should prepare gruel from a food that s digested in the intestines. In other cases it is necessary that he stomach bear most of the burden, and then food should be taken tha it digested in the stomach.

It must always be enjoined upon the patient that gruels containing starch must be eaten with some hard food, or sipped very slowly. They are a form of food which is likely to be taken without sufficient mastication, and the insalivation is insufficient. It is essential that it be sipped very slowly so that it will be retained in the mouth long enough to mix with the saliva, or that it be eaten with some hard food.

Recipes.

Oatmeal gruel.--Into a quart of boiling water stir two heaping tablespoonfuls of coarse oatmeal. Cook it over the fire as you do the grains until it is thickened, then cook it in a double boiler for at least three hours, strain, and add to it a small quantity of cream. The gruel may be prepared from previously cooked oatmeal by thinning it with water, milk, or cream. You can also prepare an oatmeal gruel by a quicker process by pounding a cupful of oatmeal in a mor-ter very fine, then putting it into a bowl, filling it with water, and stir thoroughly; then turn this water off and fill the bowl a second time, stir, and turn off the liquid as before. Then take this water and boil down to a gruel. It will probably take from one half to three quarters of an hour. Either one may be prepared in what is called lemon oatmeal gruel by flavoring with a small quantity of lemon juice and sugar, omitting the cream.

not at all thereafter until the cooking process is completed. Pearl Wheat, barley, ets.- the coarser grains- may best be put to cook in cold or lukewarm water. The heat should be continuous but gentle. When grains are soaked over night in cold water before cooling, the gluten is extracted to a greater or less degree, and makes the whole mass gluey, sticky and uninviting in appearance. The flavor is also impaired.

Tastes differ as to the desirability of having the grains cooked as dry as possible or whether they should be quite moist. It is easier to secure proper mastication if the grains are semi-solid when done. This end may be secured by using bulk for bulk of grains and water.

Oat Groats Loaf.

Take a cup and a half nice oat groats and add to them an equal quantity of water. Place in a double boiler and steam for an hour; the inner vessel is entirely surrounded with stea m, I I-2 to 2 hours otherwise. It will then be found sufficiently hard to retain its form. The mold may be placed on a deep plate and served in slices to cubes of delicate appearance. Dress with cream or with fruit juice.

Pearled Wheat Loaf.

Put two cups of pearled wheat and two and a half cups of water in a double boiler. Cook continuously from two to three hours, when each grain will be distinct and perfect. As this will crumble somewhat, dish in saucers directly from the cooker, and add to each two tablespoonfuls of canned peaches or a sauce made from dried apricots. If preferred, cream or rich milk may be

used as a dressing.

Permit me to subjoin a table from a lecture by Mrs. E. E. Kellogg before the Battle Creek Sanitarium nurses as to what her long experience has ~~been~~ found to be the proper proportions of water and grains for the best cooking, and also a few resipes from the same source:

Grains		Water	Time
Cracked wheat	I cup	4 cups	4 to 6 hours
Pearl barley,	I"	4,, ,,	4 to 6 ,,
Coarse hominy	I,,	5 ,,	6 to I0 ,,
Fine hominy	I ,,	4 ,,	4 to 6 ,,
Coarse oatmeal	I ,,	4 ,,	4 to 6 ,,
Rolled oats	I ,,	3 ,,	2 ,,
Rolled wheat	I ,,	3 ,,	3 ,,
Rice	I ,,	3 ,,	I ,,
Graham grits	I ,,	4 ,,	3 to 5 ,,
Ceraline	I ,,	I 5/8	I-2 ,,

Steamed Rice.

The best way to cook rice is to steam it in rather a flat dish over a kettle of boiling water. This allows it to spread out more than is possible in a deep dish. Preferably, cook it in the dish in which it is to be served. Take one cup of rice and one cup of warm water, and half a cup of milk - the rice having been thoroughly washed and cleaned before this. Soak an hour. Then add one cup of warm milk and a half cup of warm water. Steam for an hour over a kettle of boiling water. Every grain will then be perfect so that it can be picked up separately. The proportions

and time must be just as stated.

Oatmeal.

Moisten slightly one cup of oatmeal and then pour over it a quart of boiling water. Boil rapidly and stir continuously until it sets, and then place inside a double boiler and cook for three hours longer.

Farina.

Bring a quart of milk, or if preferred, half milk and half water, to the boiling point, and then stir in five tablespoonfuls of farina, wet with just enough milk to moisten it. Let it boil rapidly until set , and then steam in a double boiler for an hour.

Molded Farina

The above makes a dainty dessert by substituting cream for part of the milk, and adding four tablespoonfuls of sugar at the same time with the farina. Mold with whipped cream flavored with lemon or vanilla, or with fruit juice thickened with corn starch.

Graham Grits.

Take a cup of grits to a pint of boiling water. Pour in the grits slowly and stir rapidly. Stir and boil until well thickened, and then steam inside a double boiler from two to three hours.

Rasins, stoned dates or chopped figs may be added to cracked wheat, pearl barley, oatmeal, or Graham mush, and will be found to give increased relish. Most of the grains are very nice molded and served cold as simple desserts, with a dressing of fruit or cream.

By Helen L. Manning

The Nightingale

A good breakfast is the very best capital upon which people who have real work to do in the world can begin the day. If the food for this meal is well selected and well prepared it furnishes both cheer and strength for their daily task. Since our bodies are made of the food we eat if we have poor food we shall have poor blood and in consequence poor muscles, poor nerves, poor brains incapable of first class work in any capacity. Good food is such food as furnishes the requisite nutriment with the least fatigue to the digestive powers. It is the best material prepared in the best possible manner and with pleasant variety. Not too great variety at one meal but variety from day to day. Such food may be very simple in character but whatever it is it should be the very best in quality.

While the meal that breaks the fast may be considered perhaps the most important meal of the day it is oftenest the one most puzzling to the housekeeper to plan and as far as my observation goes it is one very apt to be made up of articles difficult of digestion. Owing to the limited time for its preparation the usual breakfast , as fried mush, fried bread, fried potatoes, fried fish balls, griddle cakes which although they need but little time for preparation require a long time for digestion. Fried foods and foods cooked in fat are particularly difficult to digest since the gastric juice does not digest free fat and its admixture with other food elements , hinders their digestion also. The interval usually intervening between breakfast and

dinner is short , seldom over five hours usually at the longest and it is essentially important to good health that one meal be entirely disposed of by the digestive organs before another is taken. It is likewise important for perfect digestion that at least an hours rest be given the stomach after the disposal of one meal before it is called upon to begin work upon another.

It will be evident then that if we give the stomach one hours rest as we ought we shall have to select for our breakfast bill of fare from such foods as can be well digested in at the longest four hours, or lengthen the interval between meals.

There is another class of foods frequently used for breakfast to which I am led to object bacause of otger reasons. I refer to salt meats and fish like salted macherel and codfish and similar foods. Such foods contain very little nutriment and their salty thirst provoking character I am led to believe is an important auxilliary to the acquirement of a love of intoxicating drinks. I fear it often happens that women who send out their loved ones with an agony of prayer that they may be kept from drink for the day also send them with a breakfast that will make them half frantic with thirst before they get to the first saloon.

You ask what shall we get for breakfast let us look at the chart and see . Grains and articles made from the grains with plenty of fruit I believe offers the requisites for the ideal breakfast. Meats , vegetables and compound dishes of all sorts are better reserved for the dinner bill. Fruits and grains offer ample provision for variety, they are easily made ready and they

are easily digested while at the same time furnishing excellent nutriment in ample quantity and of the very best quality . Aside from the grains preparations themselves and breads in variety of which I have already told you there are a large number of most appetizing toasts suitable for the breakfast table. I call them toasts but as they are prepared so unlike what is ordinarily termed toast I am not sure but a new name will have to be given them. Toast as ordinarily prepared is not by any means the most digestible article of food.

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There are but few homes where the question of what to get for breakfast is not a perplexing one. Limited time for its preparation necessitates that it be something quickly prepared. The fact that it is the first meal of the day, the foundation meal so to speak demands that it be something hot and substantial. mistake The shortness of time generally intervening between the breakfast & dinner requires that it be something easily digested. This gives us three reasons special points to be remembered in the selection of our breakfast bill of fare. We must choose something quickly prepared, nutritious and easily digested. Aside of course it must be appetizing and economical. The majority of housekeepers give due consideration to the first and last points but are quite apt to overlook the need of the food supplied being substantial and easy of digestion. Hot griddle cakes, stashes fried potatoes, fried mush, fried meats, eggs and in

in fact a great many other fried abominations make up the breakfast bill of fare in a great majority of homes. These foods have the merit of being quickly prepared, and if we should resolve them into their original elements we might perhaps find them made up of considerable nutritive material, but the value of this is largely counterbalanced by their indigestibility. The griddle cakes are perhaps the least objectionable, although it will be apparent to you after all that has been said about bread that they are in general too soft in texture to be readily digestible when they are usually prepared with soda or with yeast, and since they are eaten hot if prepared with yeast they must of necessity be subject to all the objections of newly baked yeast bread. But indigestible as they are in themselves

selves they are rendered even more so by the syrups and butter used on them and without which they would hardly be found relishable. A griddle cake to be wholesome would need to be entirely different in most respects from those ordinarily served and the molasses and other condiments usually dispensed with in the serving, so that I suspect to the majority of people a substitute would seem preferable to the revolutionized griddle cake.

Hashes are generally compound of left over foods, and certainly it is economical to make use of these but in general the preparation of the hash makes these foods far less digestible than they were in the first serving. The small bits into which they are generally chopped make them so fine as to be liable to be swallowed without proper mastication but the worst feature is the butter and other hot fats they are so generally cooked in, and the condiments with

with which they are universally seasoned. Foods cooked in some fats, in any form are rendered difficult of digestion, since fat is itself not digested in the stomach but its connection with other foods hinders their digestion also. In the process of frying the action of the heat partially decomposes the fat, in consequence, various poisonous substances are formed highly detrimental to the digestion of the partaker of the food. Hence all fried foods must be denominated as difficult of digestion. There is another class of foods quite largely used on the breakfast table that ought to be discarded and those are the salted meats, salt fish, mackerel, codfish, and dried and cured meats, such foods are very lacking in nutritive value in the first place and so saturated with salt that it is quite impossible to freshen them sufficiently so that they are not great thirst

K

producers, The problem of the drunkard is greatly augmented by ~~the use~~ breakfasts of salted foods.
One who has given this subject much thought has said, how often it happens that women who send forth their loved ones with an agony of prayer that they may be kept for the day also send them forth with a breakfast that will make them half frantic with thirst before they have reached the first tavern,

The children too go to their school tasks with a load of indigestible food in their stomachs which results in dull brains and mischievous propensities quite out of the proper order of things.
I believe the breakfast has much to do with making the day a success physically, morally and spiritually and that those upon whom devolve its preparation need to study

the matter in all its bearings.
A good, wholesome easily digested breakfast furnishes both cheer and strength for our daily tasks
And of what shall the breakfast be composed. It is a very fortunate fact that those most nutritious of foods the grains are in general easily digested, and we may rely upon them as a staple article. They fill every requisite, they are quickly prepared if cooked the day previous, they are wholesome, palatable, easy of digestion when properly served, and economical
With the addition of fruits they fill every requirement for an ~~simple and perfect~~ ideal breakfast,
The grains offer ample opportunity for a great variety of palatable dishes so that no sameness is necessary, ~~of~~ Mushes and breads you have already had instructions in preparing,
There is also another dish prepared of grains and fruits which forms

a most palatable breakfast dish, which I call toast, but it is so wholly different from what is ordinarily termed toast I am not sure but I ought to invent a new name. Toast as ordinarily served is a most unwholesome article, Yeast bread is ~~the~~ its foundation. Yeast bread when fresh and new, you have already learned is so moist that when masticated it forms into masses difficult of digestion because so compact the gastric juice can not readily permeate it, and the yeast germs within these masses being surrounded by both warmth and moisture the especial conditions requisite for their growth; begin to grow and fermentation begins. Now although bread as it grows older and more stale seems apparently drier it is a fact that it still contains nearly so the same amount of moisture that it did when first baked only the moisture is in a

state of concealment. This can be
prown by putting a loaf of
stale bread in an air tight
receptacle and subjecting it
to a degree of heat equal to
that of boiling water for a time,
half an hour will ordinarily do,
when the bread will have all
the characteristics of new bread.
The heat draws the moisture out
of concealment. In the preparation
of toast before the fire each slice
of bread undergoes this same process
and while from the outer surface the moisture
is evaporated by the heat the inner
portion is rendered exactly like
new bread, moist and when eaten
hot almost as difficult of di-
gestion, if butter also be added
its indigestible properties are
greatly increased. The portion
of the bread which is toasted is rendered
more digestible but this portion is
only the surface, while the greater

portion is rendered less digestible If however we continue the toasting long enough so the bread shall be dry and crisp throughout, instead of merely on the surface we shall have the bread in the most digestible form it is possible to prepare yeast bread. By this toasting the yeast germs are all Effectually destroyed the water evaporated and the starch changed in a great measure to dextrine. Such toast may be prepared by subjecting it to the heat for a long time in an open fire but it is a tedious process and is more easily accomplished by placing the slices of bread on a perforated tin pie in an oven and subjecting it to moderate heat for half an hour or longer, until crisp and brown through out. Such toast or Zwieback

may then be used in a great variety of ways as a breakfast dish. One of the simplest is what I call dry toast with hot milk or cream, A slice is placed in each individual dish and hot cream poured over it. The toast may also be softened by dipping in hot cream, for this but a small amount of cream will be needed, Cream should scalding but not actually boiling as the bubbling has a tendency to break the pieces and does not seem to penetrate them so readily as that not in action, and I have thought it made it more tough. With a spoon and a fork one, two or three slices may be easily managed. They should be left long enough to become soft but not mushy If they retain a little of their original crispness I think they are even better. When they are softened

pack in a deep hot dish one on top of another and place this covered in a pan of hot water until needed for if there is one important point to be remembered in serving a breakfast it is to have the food hot.

A sauce for the toast may be with cream ~~or~~ rich milk thickened with flour and turned a gravy, the same with the addition of the white of ~~an~~ egg just at the last, so incorporated as only to coagulate the white not harden it, and termed snowflake, Or a sauce may be prepared of dried fruits cooked in the usual manner as slowly and moderately as possible then rubbed through a colander to render them homogenous. Or canned or stewed berries may be prepared into a sauce as follows.

Fresh berries make a very nice sauce by mashing them as for jam adding a little sugar to sweeten

more kinds may be used by either diluting or adding apples and peaches

and serving on will moistened toast. A gravy of lentils also makes a nice dressing for toast, asparagus vegetable oysters, celery, prepared by stewing and the gravy thickened with a little flour make very palatable toasts, where vegetables are desired For softening the dry toast for tomato vegetable oyster or asparagus toasts the liquor of the vegetable may be used if cream can not be afforded. It should be hot but more care will be needed in its use than when cream is used as being less dense it penetrates the porous toast much more readily, and I have generally found it best to the liquor hot and in a pitcher then to dish the dry toast in saucers pour the liquor carefully over it on all sides and add the sauce as I serve it rather than to let it stand to soak, The juice of berries may be used to moisten the zwieback for berry toast when cream is not obtainable

but is hardly as desirable as cream except when it can not be obtained. Milk is not to be used for berry and fruit toasts when cream is not obtained as it makes an insipid compound. Cream diluted with water is better than milk,

In preparing the dry toast or zwieback stale bread is available and offers ample opportunity for using up all left over shêds, while the left over bits can be used for croutons This dry toast can be kept almost an unlimited time if kept in a dry cool place, and thus a supply can be prepared whenever one has a fire and the oven is heated, and kept on hand ready for use at any time. Care must be taken that it does not scorch as it will then be spoiled

With grains in the form of mush, breads, toasts supplemented with a plentiful supply of fruits we have ample to make up

our breakfast bills of fare. Vegetables are not needed and are better left for use at dinner particularly with those who have weak digestions as such will find it difficult ~~to digest~~ the fruits and vegetables ~~together~~. Just here I wish to speak of an error I fear some of you may ~~well~~ fall into judging from your papers, in ~~supposing that~~ speaking of the use of fruits and vegetables ~~can not be digested~~ together Persons with vigorous digestions may experience very little difficulty in using fruits and vegetables together it is only those of feeble digestive powers that will be most likely to find the two harmful when used together at the same meal, It is not necessary to use the two together at breakfast as an ample and pleasing variety can be prepared of fruits and grains alone, for example let me give you a few sample breakfast bills of fare.

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Breakfast,

Oranges
Rolled Oats,
Gravy toast
Corn Cakes Graham Puffs. Toasted Wafers
Baked Apples,
Stewed Prunes

Apples
Rolled Wheat
Tomato Toast
~~Roasted Almonds~~ or Baked Chestnuts
Graham Gems. Breakfast Rolls
Toasted Wafers
Dried Apples stewed with Raisins

Oranges
Graham Grits
Prune Toast
Lettuce
Graham Crusts Toasted Wafers
Canned Peaches

Apples
Rolled Rye
Snowflake Toast
Lemon Chiffe
Whole Wheat Puffs Graham Crackers
Stewed Dried Pears

14 Cherries

Cracked Wheat

Dry Toast with hot cream —

Graham Puffs, Toasted wafers or Sticks

Roasted Almonds

Fresh Strawberries

Melon,

Graham Mush with Dates

Fresh berry toast

Whole Wheat Puffs. Wafers, Graham Rolls

Stewed Fruit

Grapes

Boiled Wheat

Peach toast

Sliced Tomato

Graham Puffs, wafers, Whole Wheat Bread

Stewed Apples

Grapes

Peach mush

Cream Toast

Corn dodgers, Graham Puffs, wafers,

Baked Pears

Stewed fruit

You will begin the meal with a fresh fruit, as an appetizer it may be arranged on the plates with such necessary accompaniments as needed before the family are seated at the table. The grain may be dished and the toast prepared and both placed in a bain marie to keep hot and placed on the side table, —

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Oranges, 8 c	18	
Rolled Oats ½ lb	2 ½	
Zwieback	2	
Milk for Sauce and Cream for the grams, grms. etc.	20	
Baked apples	3	
Stewed Prunes,	10	
Material for beads	6	
Wafers	3 –	
		13
		10
		23
		23
		46
		6) 66 ½
		11

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IT IS OUR PURPOSE TODAY TO OFFER YOU SUGGESTIONS FOR A DINNER IN THAT ~~WILL~~ SHALL FULFIL ALL THE REQUIREMENTS OF A HEALTHFUL NUTRITIOUS DIETARY. WE WILL SUPPOSE OUR DINNER IS TO BE SERVED AS FAR AS PRACTICABLE BY COURSE. FOR THESE REASONS THAT IT WILL REQUIRE A LITTLE LONGER TIME TO COMPLETE THE MEAL THUS MAKING IT EASIER TO AVOID THAT VIOLATION OF HYGENIC LAWS, HASTY EATING, AND ALSO BECAUSE WHEN FOOD IS PROVIDED A PORTION AT A TIME THE SENSE OF SATIETY IS MORE READILY ~~NEEDED~~ recognized AND OVER EATING LESS LIKELY TO BE THE ~~RULE~~ result. IT IS OF COURSE MORE DESIRABLE ALSO FROM AN ESTHETIC STANDPOINT.

SOUP IS IN GENERAL ACCORDED THE FIRST PLACE ON THE DINNER BILL OF FARE AND IT IS WELL THAT IT SHOULD BE SO, SINCE SOUP TAKEN HOT AT THE BEGINNING OF A MEAL STIMULATES THE FLOW OF THE DIGESTIVE FLUIDS AND PREPARES THE STOMACH TO RECEIVE AND DIGEST OTHER FOODS.

IT IS GENERALLY SUPPOSED THAT WHEN SOUP IS MENTIONED SOME PREPARATION OF MEAT AND BONES IS REFERRED TO BUT I REFER WHOLLY TO SOUPS PREPARED FROM GRAINS, LEGUMES AND VEGETABLES WHICH ARE IN EVERY PARTICULAR VASTLY SUPERIOR TO THOSE PREPARED FROM MEAT AND BONES AS A CONTRAST OF THE TWO WILL READILY SHOW. FOR EVERY QUART OF SOUP PREPARED FROM MEAT ONE HALF POUND OF LEAN MEAT AND THE SAME PROPORTION OF BONE IS REQUIRED. ~~NOTHING~~ little BUT GELATINE IS ABSTRACTED FROM BONE WHICH GIVES TO THE SOUP A BETTER CONSISTENCY BUT WHICH YOU DO NOT NEED TO BE TOLD POSSESSES NO NUTRITIVE VALUE. SO THAT IN REALITY ALL THE NUTRIT~~IVE~~MENT CONTAINED IN THE quart of SOUP MUST BE ~~GOTTEN~~ derived FROM THE ONE HALF POUND OF lean MEAT. SUPPOSE IN CONTRAST WE HAVE SOUP ~~MADE~~ prepared FROM PEAS. ONE HALF A POUND OF THESE LEGUMES WILL DO NICELY FOR A QUART OF

SOUP SO WE HAVE EXACTLY THE SAME AMOUNT OF MATERIAL FOR BOTH SOUPS ~~AN~~ AND CAN COMPARE THIER RELATIVE NUTRITIVE VALUE BY COMPARING THIER ANALYSIS WITH WHICH YOU ARE DOUBTLESS SO FAMILIAR THAT IT SCARCELY NEED TO SAY THATTHE LEGUMES CONTAIN MORE THAN ABOUT TIMES AS MUCH NOURISHMENT AS DOES THE LEAN BEEF. THIS OF COURSE ASSUMES THAT ALL THE NOURISHMENT CONTAINED IN BOTH THE PEAS AND BEEF IS RETAINED WITHIN THE SOUPS. UNFORTUNATELY DURING THE LONG PROCESS REQUIRED FOR THE PREPARATION OF THE meat SOUP THE NUTRITIOUS PRINCIPLES OF THE MEAT ARE LARGELY DEPRIVED OF ALL THIER QUALITIES OF ORGANIC NOURISHMENT SO THAT WHEN READY FOR USE A SMALL AMOUNT OF FAT, SOME MINERAL SALTS AND A CERTAIN PROPORTION OF GELATINE IN A large QUANTITY OF WATER SUMS UP ITS TOTAL NUTRITIVE VALUE AND MAKES WHAT DR. AUSTIN flint CALLS STARVATION DIET AND OF WHICH ANOTHER EMINENT AUTHORITY HAS SAID COMMON WELL WATER CONTAINING THE AVERAGE AMOUNT OF BACTERIA IS MORE NOURISHING.

THE SOUP FROM PEAS ON THE OTHER HAND WHILE POSSESSING SO MUCH HIGHER NUTRITIVE VALUE, HAS THE MATERIAL ENTERING INTO ITS COMPOSITION so DISINTEGRATED AND BROKEN UP BY THE PROCESS OF PREPARATION THAT IT IS in ITS MOST EASILY DIGESTED FORM. SUCH SOUPS ARE ALSO MOR QUICKLK AND EASILY PREPARED THAN MEAT SOUPS, AND ARE MORE ECONONCICAL BEING ALSO MORE WHOLESOME AND NONSTIMULATING.

TO PREPARE SOUPS FROM GRAINS, LEGUMES AND VEGETABLES WE MUST F FIRST COOK THEM IN THE ORDINARY MANNER USING AS SMALL AN AMOUNT OF LIQUID AS POSSIBLE AND PREVENT THIER BURNING.

IF THE MATERIAL USED BE GRAINS BE GRAINS OR LEGUMES THE COOKING SHOULD BE slow ~~LONG~~ AND PROLONGED IN ORDER TO MAKE THEM MORE DIGESTIBLE. THE OBJECT TO BE ATTAINED IN THE COOKING OF ALL FOODS IS THE PARTIAL DIGESTION OF THIER FOOD ELEMENTS AND IN THE CASE OF GRAINS AND LEGUMES

THE MORE SLOWLY IF CONTINUOUS THE COOKING PROCEEDS THE MORE COMPLETELY WILL THIS RESULT BE BROUGHT ABOUT.

WHEN THE MATERIAL IS COOKED THE NEXT STEP IS TO RENDER IT HOMOGENEOUS THROUGH OUT, AND TO REMOVE ANY SKINS, TOUGH FIBRES OR CELLULOSE MATERIAL. TO ACCOMPLISH THIS WE RUB IT THROUGH A COLANDER A FINE OR COARSE ONE ACCORDING TO THE MATERIAL USED. THE NEXT STEP IN THE PREPARATION IS TO ADD TO THIS MATERIAL A SUFFICENT QUANTITY OF LIQUID TO MAKE IT ABOUT THE RIGHT CONSISTENCY. FOR MOST SOUPS THE PREFERABLE LIQUID FOR THIS PURPOSE IS MILK, FOR SOUPS PREPARED FROM POTATO RICE AND SIMILAR STARCHY FOODS MILK IS PARTICULARLY ESSENTIAL TO INCREASE THE ELEMENTARY VALUE OF THE SOUP BUT WITH OTHERS OF THE GRAINS AND THE LEGUMES WHICH POSSESS A HIGHER NUTRITIVE VALUE THEMSELVES HOT WATER MAY BE USED IF MILK IS NOT ATTAINABLE OR DESIRABLE. THE MATERIAL NOW REQUIRES RE HEATING, DURING WHICH ANY ESPECIAL FLAVOR LIKE CELERY ~~MAY~~ may be secured BY ADDING TO IT A FEW STALKS, WHICH WHEN THE SOUP IS WELL HEATED MAY BE REMOVED WITH A FORK. WHEN THE SOUP WILL BE FOUND TO DELICATELY FLAVORED WITH CELERY. SALT MAY ALSO BE ADDED NOW, THE QUANTITY NEEDED WILL DEPEND SOMEWHAT UPON THE KIND OF SOUP AS ALSO UPON THE CONSUMER BUT ONE ~~TABLE~~ tea SPOONFUL TO A QUART WILL BE FOUND IN GENERAL AN AMPLE SUPPLY. TO MAKE CERTAIN OF THAT PERFECT SMOOTHNESS SO DESIRABLE IN MOST SOUPS AFTER IT IS REHEATED THE SOUP SHOULD BE AGAIN TURNED THROUGH A COLANDER OR CHINESE SOUP STRAINER AFTER WHICH ADD TO IT AS SEASONING ONE CUP OF THIN CREAM TO EVERY THREE PINTS OF SOUP AND IT IS READY FOR USE. BEING SO LARGELY COMPOSED OF FOOD MATERIAL, IT LIKE ALL OTHER FOODS REQUIRES INSALIVATION AND CONSEQUENTLY IS BEST EATEN IN CONNECTION WITH SOME HARD FOOD. A VERY SERVICEABLE AND SUITABLE ARTICLE FOR THIS PURPOSE

Show soup is right consistency

TO BREAD CUT IN DICE AND BROWNED THROUGHOUT AND WHICH IS THE PRACTICE OF GOOD COOKS ARE TERMED CROUTONS. A FEW OF THESE may be placed IN A SOUP PLATE. THIS IS ALSO A VERY ECONOMICAL MEASURE, AS IT GIVES OPPORTUNITY TO MAKE USE OF THE LEFT OVER BITS OF BREAD. IN HOUSEHOLDS WHERE CROUTONS ARE SERVED IN SOUP AND AND TOAST IS AN ARTICLE OF FREQUENT CONSUMPTION THERE NEED NEVER BE ANY QUESTION AS TO WHAT TO DO WITH THE STALE BREAD, PROVIDED OF COURSE IT BE GOOD, SO THAT THIS PLAN WHILE A MOST WHOLESOME ONE IS ALSO ECONOMICAL ONE.

THERE ARE SEVERAL OTHER ECONOMICAL POINTS ABOUT THE USE OF SOUP WORTHY OF MENTION. THEY OFFER THE BEST OPPORTUNITY FOR THE USE OF LEFT OVER FRAGMENTS OF GRAINS AND VEGETABLES. INDEED SUCH MATERIAL WELL KEPT, IS JUST AS GOOD IN ~~MANY CASES~~ most AS FRESHLY COOKED MATERIAL.

MATERIAL PREPARED BY BEING COOKED AND RUBBED THROUGH A COLANDER ON FRIDAY AND LEFT DRY IN A COOL PLACE, MAKES IT POSSIBLE TO HAVE A HOT APPETIZING SOUP FOR THE SABBATHS DINNER WITH ONLY THE FEW MINUTES WORK OF ADDING THE LIQUID, HEATING, AND SEASONING.

IF IT BE DESIRABLE TO USE RICE, VERMICELLI OR SIMILAR FOODS IN SOUP THEY MUST BE FIRST COOKED SEPARATELY AND ADDED JUST BEFORE SERVING.

VEGETABLES, LEGUMES, MACARONI, AND SUCH FRUITS AS TOMATO, SQUASH AND EGG PLANT OFFER AMPLE MATERIAL FOR THE NEXT COURSE. IN THE SELECTION OF THESE FOODS FOR THE BILL OF FARE GREAT CARE WILL BE NEEDED THAT SUCH ARE CHOSEN AS MAY BY COMBINATION AFFORD AS NEARLY AS POSSIBLE THE PROPER AMOUNT OF THE FOOD ELEMENTS. SINCE MOST OF THE VEGETABLE FOODS RANK LOW IN NUTRITIVE VALUE, THE USE OF MACARONI, OR ONE OF THE LEGUMES ARE DESIRABLE ADJUNCTS TO THIS COURSE. IF WE HAVE FOR ONE COURSE, POTATO, CABBAGE, AND PARSNIPS, OR POTATO, TOMATO,

AND GREEN PEAS ~~OR POTATO, TOMATO, AND GREEN PEA~~ OR POTATO, STRING BEANS AND BEETS WE SHALL HAVE SECURED VERY LITTLE NITROGENOUS MATERIAL AND OUR MEAL WILL BE LACKING IN THAT IMPORTANT FOOD ELEMENT OR WE SHALL NEED TO MAKE UP THAT DEFICENCY IN SOME OF THE COURSES THAT FOLLOW. IF HOWEVER WE TAKE THE CARE TO USE SOME FOOD CONTAINING AN ABUNDANCE OR AN EXCESS OF NITROGENOUS MATERIAL IN CONNECTION WITH OUR VEGETABLES WE SHALL HAVE A MORE SYMMETRICAL BILL OF FARE.

FOR EXAMPLE LET OUR VEGETALE COUR E BE POTATO, CUC T [illegible] F S [illegible] T PEAS AND PARSNIP, OR POTATO, MACARONI WITH TOMATO AND GREEN PEAS, OR POTATO, MASHED DRIED PEAS, AND BEETS. ALL THE LEGUMES ARE ESPECIALLY RICH IN NITROGENOUS MATERIAL AND ARE WELL FITTED TO SUPPLEMENT THE ~~Z~~ VEGETABLES IN THIS PARTICULAR. I REFER TO THE DRY LEGUMES however THE GREEN LEGUMES ARE MORE LIKE THE SUCCULENT VEGETABLES AND DO NOT POSSESS THE EXCESS OF NITROGENOUS MATERIAL WHICH CHARACTERIZES THE SEEDS IN THIER DRY STATE. THIS NITROGENOUS MATERIAL SO NEARLY RESEMBLES THE CASEIN OF milk THAT CHEESE CAN BE MADE FROM PEAS AND BEANS. ACCORDING TO JOSEPHUS LENTILS FORMED THE CHIEF DIET OF THE PYRAMID BUILDERS. THE LEGUMES ARE PARTICULARLY VALUABLE AS STRENGTH PRODUCERS AND ARE LARGELY USED IN THE DIET OF PERSONS TRAINING AS ATHLETICS. Show THEY ARE FOODS DESERVING A MUCH MORE EXTENDED USE THAN IS GENERALLY ACCORDED THEM, PARTICULARLY PEAS AND LENTILS. TO PREPARE THEM IN THE MOST DIGESTIBLE FORM THEY MUST BE SERVED WITHOUT THE SKINS OR WITH THE SKINS VERY FINELY DIVIDED, THIS IS ALSO NECESSARY IN ORDER THAT THE GREATER PART OF THIER ~~[illegible]~~ VALUABLE NUTRIMENT MAY BE USALLE. AS was PROVEN BY THE EXPERIMENTS OF PROF. STRUMPFEL WHO FOUND THAT WHEN HE ATE BEANS BOILED WHOLE WITH THE SKINS ON HE WAS ONLY ABLE TO DIGEST

SIXTY PER CENT OF THE NITROGENOUS MATERIAL THEY CONTAINED. WHEN HOWAVER HE REDUCED THE SAME QUANTITY OF BEANS TO A FINE POWDER PREVIOUS TO COOKING HE WAS ENABLED TO DIGEST 91.8 PER CENT OF IT.

ALL OF THE LEGUMES MAY BE PREPARED without the skins INTO MOST EXCELLENT DISHES ~~MINUS THE SKINS~~ BY FIRST COOKING THEM UNTIL TENDER ALLOWING THE WATER TO EVAPORATE AS COMPLETELY AS POSSIBLE THEN RUBBING THE MATERIAL THROUGH A COLANDER AND SEASONED WITH a little SALT AND CREAM. ~~THIS~~ MAY BE LEFT IN A MOIST CONDITION TO BE SERVED AS A PUREE OR MAY NOW BE PUT IN THE OVEN AND BAKED FOR A SHORT TIME UNTIL DRY AND MEALY FORMING WHAT IS TURN MASHED PEAS, WHICH MAY BE SERVED IN ITS DRY STATE OR WITH A TOMATO SAUCE. IN EITHER WAY IT WILL BE FOUND VERY PALATABLE, AND SO EASILY DIGESTED THAT MANY PEOPLE WHO ARE UNABLE TO USE THE LEGUMES AT ALL AS ORDINARILY COOKED EXPERIENCE NO DIFFICULTY WHATEVER DIGESTING THEM WHEN PREPARED IN THIS MANNER.

LENTILS and ~~AS WELL AS~~ BEANS MAY BE PREPARED IN A SIMILAR MANNER. THESE SEEDS ARE ALL BEST COOKED BY SLOW BOILING OR STEWING FOR A LONG TIME. SOFT WATER IS ESSENTIAL AS THE MINERAL ELEMENTS IN HARD WATER HARDEN THE CASEIN SO THAT IT IS DIFFICULT TO MAKE THE SEEDS TENDER. THE QUANTITY OF water needed for cooking ~~WATER~~ NEEDED WILL VARY WITH THE AGE OF THE SEEDS AND THE RAPIDITY OF THE COOKING BUT IN GENERAL 2 QUARTS OF WATER WILL BE SUFFICIENT FOR ONE PINT OF ~~PEAS~~ SEEDS. OF ~~THE~~ OTHER foods VEGETABLES THE TUBERS ARE THE MOST NUTRITIOUS AND OF THIS CLASS THE POTATO RANKS FIRST IN ALIMINTARY VALUE. THIS VEGETABLE IS BEST COOKED WITH THE SKINS ON. ITS CHIEF MINERAL CONTSTITUENT IS POTASH WHICH BEING FREELY SOLUABLE IN WATER. WHEN THE POTATO IS BOILED WITHOUT THE SKINS THERE IS NOTHING TO PREVENT THE SALTS FROM ESCAPING INTO THE WATER IN WHICH THE POTATO IS BOILED. IF HOWEVER THE POTATO BE BOILED WITH THE SKINS ON, THE

EVEN GOES OFF ALMOST WHEN THE VEGETABLE IS NEARLY DONE ENOUGH TO KEEP THE POTASH LARGELY WITHIN THE POTATO. THE WASTE WHEN COOKED INTO THE SKINS ON IS ONLY 3 PER CENT WHILE WITHOUT THEM IT IS OVER 14 PER CENT. FOR THE SAME REASON POTATOES SHOULD NOT BE PARED AND SOAKED OVER NIGHT BEFORE COOKING AS IS A VERY COMMON CUSTOM. THE GREAT DISIDERATUM TO BE OBTAINED IN THE COOKING OF A POTATO IS TO HAVE IT MEALY AS THIS IS ITS MOSTDIGESTIBLE CONDITION, THIS CAN BE more EASILY ACCOMPLISHED, BY BAKING THAN BY BOILING. MORE OF ITS NITRITIVE PROPERTIES ARE ALSO PRESERVED BY THIS METHOD OF COOKING. PARSNIPS, BEETS, AND OTHER TUBERS ARE MUCH BETTER COOKED BY BAKING THAN BY BOILING. VEGETABLES ARE AMONG THE FOODS THE MOST SELDOM WELL COOKED, MANY BEING SERVED IN AN UNDER DONE STATE TO PRESERVE THIER COLOR WHILE QUITE AS MANY MORE ARE COOKED UNTIL OVERDONE AND WATER SOAKED. EITHER CONDITION RENDERS THEM MORE OR LESS DIFFICULT OF DIGESTION. THIER DIGESTIBILITY IS SOME WHAT VARIED ALSO BY THE FREE FAT SO FREQUENTLY USED FOR SEASONING. CREAM IS THE PREFERABLE SEASONABLE FROM A HEALTH STANDPOINT FOR THE REASON WITH WHICH YOU ARE ALL ~~OF YOU~~ DOUBTLESS FAMILIAR, THAT EACH ATOM OF FAT BEING SURROUNDED BY A FILM OF CASEIN ~~BEING~~ THUS PROTECTED FROM THE ACTION OF THE GASTRIC JUICE and DOES NOT INTEREERE WITH THE STOMACH DIGESTION OF OTHER FOOD MATERIAL AS DOES THE USE OF BUTTER AND OTHER FREE FATS. IF VEGETABLES ARE COOKED AND MUST WAIT BEFORE BEING SERVEDTHEY SHOULD AT ONCE BE DISHED INTO A HOT DISH AND THE DISH PLACED IN A WATER BATH. IF ONE HASNOT ONE PURPOSELY ARRANGED FOR THIS AN ORDINARY PAN FILLED WITH HOT WATER AND A SECOND ONE TO COVER. THE VEGETABLE DISH SHOULD ALSO BE COVERED. IN THIS WAY THE FOOD WILL RETAIN ITS ~~FOOD~~ heat BUT WILL NOT BE OVER COOKED AS WHEN LEFT IN THE KETTLE UPON THE STOVE.

THE NEXT COURSE OF OUR DINNER may BE GRAINS. CONCERNING THE

THE COOKING OF WHICH INSTRUCTION HAS ALREADY BEEN GIVEN AND WHICH WITH PLENTY OF BREADS, AND FRUITS BOTH COOKED AND FRESH WILL AFFORD AMPLE VARIETY AND SUFFICENT NUTRIMENT FOR A WHOLESOME AND SUBSTANTIAL DINNER. THE SELECTION OF THE GRAIN TO BE USED SHOULD DEPEND UPON THE CHARACTER OR WHAT HAS PRECEEDED IT. IF THE BILL OF FARE SHOULD BE::

BAKED POTATO
MASHED PEAS
CHOPPED CABBAGE THEN SOME OF THE GRAINS RICH IN NITROGENOUS MATERIAL WILL BE NEEDED TO MAKE THE PROPORTION OF FOOD ELEMENTS CORRECT. BUT IF IN BOTH THE SOUP AND VEGETABLE COURSE THE NITROGENOUS ELEMENTS PREDOMINATE RICE, FARINA AND OTHER STARCHY OR GRAINS MAY BE WISELY CHOSEN. IF DESERTS ARE DESIRABLE MANY PALATABLE ONES MAY BE ~~CHOSEN~~ PREPARED FROM GRAINS AND FRUITS WHICH WILL not POSSESS THE OBJECTIONABLE QUALITIES SO COMMONLY ACCORDED TO DESSERTS BUT OF WHICH OUR TIME WIL NOT PERMIT A DISCUSSION.

I WISH HOWEVER TO CALL YOUR ATTENTION TO THESE BILLS OF FARE. THIS IS ONE TO WHICH I SAT DOWN AS A GUEST NOT ONG AGO. IT WAS WELL COOKED , THERE WAS VARIETY ENOUGH, AND ALL THE ARTICLES WERE WHOLESOME FOODS IN THEMSELVES BUT THE DINNER COULD HARDLY BE CONSIDERED UP TO THE STANDARD OF HEALTHFUL LIVING BECAUSE OF ITS LACK IN NITROGENOUS FOOD MATERIAL. THE OTHER BILL OF FARE APPROACHES MORE NEARLY THE CORRECT STANDARD, IS AS PALATABLE AND QUITE AS ECONOMICAL.

THE ARRANGEMENT OF A BILL OF FARE IS A MATTER OF NO SMALL IMPORT AND OUGHT NOT TO BE DEPENDENT UPON CHANCE AS IT IS IN SO MANY HOMES WHERE THE PLANS FOR THE MEAL ARE SELDOM LAID UNTIL THE TIME OF ITS PREPARATION HAS ARRRIVED AND THEN WHATEVER HAPPENS TO BE most CONVENIENT IF ONLY SOMETHING THAT WILL PLEASE THE TASTE IS COOKED AND EATEN.

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Cookery although one of the earliest known arts, dating back, probably to the period when driven out of the Garden of Eden, mankind was compelled to provide and prepare their own food, has been less studied, and consequently less advanced, than almost any of the other arts and sciences, not that it is less important, but because it is such an every day affair its importance has been overlooked and all consideration centered upon the labor necessitated for its performance, which has been looked upon as a menial service merely, and undertaken with no thought of the consequences involved save to produce something that would taste good and gratify the palates of those who ate it. It has seemed to appear a matter of little moment whether or not the food was one well suited to the maintanance of good health and the upbuilding and nourishing of the syatem if only it catered to the taste and satisfied the craving of hunger. With taste as a criterion it is so easy to disguise the results of the careless and improper cookery of food by the use of spices, flavors and condiments, as well as to palm off upon the digestive argans all sorts of inferior building material that poor cookery has almost come to be the rule rather than the exception. The evils resulting are manifold. Probably no other of the vital processes exert so strongea controlling influence over the mind, character and disposition of an individual as the digestive, and it is not far from the exact physiological truth to say that the health of the entire body is tempered in the laboratory of the stomach. It is evident then that good food carefully prepared is of the utmost importance if we would keep

the body in a state to serve us well. It is not only important but imperative if we would do the utmost with the talents God has entrusted to us. The voice of the apostle Paul sounding down through the ages says, "Know ye not that your body is the temple of the Holy Ghost which we have of God and ye are not your own." We are under obligations to our Creator to care for these earthly temples and fit them for use in his service, and we have no right to cripple or abbreviate their usefulness in any way. But this is certainly what we do when we feed ourselves and those dependent upon us with illy cooked indigestible viands which make poor blood and in consequence poor brains, nerves and muscles incapable of first class work. A more responsible position than that of the one who arranges the bill of fare and prepares the food for the daily meals can hardly be conceived, and for every such person a knowledge of the principles of health, of the laws of notrition, of the value of foods, and the scientific principles involved in their preparation is most essential. Such a knowledge ought to be a part of the education of every young person. We cook food for several reasons, to make it more pleasing to the eye, more palatable, to facilitate mastication, and secure by combination better food substances, but principally to make it more digestible. The proper cooking of food is a sort of artificial digestion. Each of the different food elements, with the exception of fats, is changed by cooking in much the same way as by the action of the digestive juices. Starch when boiled or baked a long time is converted into sugar, as when acted upon by the saliva or pancre-

atic juice. Albumen is, by the prolonged action of heat of a low degree, converted into peptone, as when digested by the gastric juice. Cane sugar when boiled is changed into grape sugar, especially if boiled with an acid, which fact is recognized by scientific cooks, who do not add sugar to fruit while cooking, since the change of cane sugar to glucose or grape sugar destroys its sweetness to such a degree that if added to fruit while cooking one and a half times more sugar will be needed to produce as great a degree of sweetness as would be required if added after the cooking process was completed. Fats, on the contrary, are rendered less digestible by cooking. Doubtless it is for this reason that nature has put into those foods which require the most prolonged cooking, such as grains and vegetables, so small a proportion of fat, and it certainly indicates also that any food to be subjected to a high degree of heat should not be mixed with or compounded of materials containing a large proportion of fat.

Good cookery also breaks up the solid structures of food rendering them more soluble in the digestive juices.

The methods commonly employed for the cooking of food are boiling, roasting, baking, simmering, stewing, steaming and frying; this latter, however, being a method by no means to be approved, as it is one of the worst dyspepsia producing devices imaginable. A morsel of food which has been coated with fat in frying remains undigested in the stomach because fat is not digested by the gastric juice, its combination with the other food elements of which the morsel is composed retards or entirely prevents their digestion

also. If such food is habitually taken the digestion soon becomes slow and the gastric juice so deficient in quantity that fermentation is set up and acidity, biliousness, headache, become the order of the day. In the frying process too, the action of the heat partially decomposes the fat in consequence of which various poisonous acids are formed which are highly detrimental and certain sooner or later to produce derangement of digestion. Rich pastry, cake, hot buttered toast, or melted butter on beefsteak, are objectionable on the same ground, and such articles should be discarded by all who wish to preserve a good digestion for themselves of their families. Only a small amount of fat is needed for use by the system and this is best taken in the proportion and form in which nature herself supplies, as in cream, or in the shape of such fats as are contained in nuts, and in the grains and seeds such as oats, corn, peas, beans and lentils.

The other methods of cookery named are all excellent when scientifically performed and when well adapted to the articles to be cooked, it being necessary to choose the method to be used in accordance with the purpose it is desirable to attain in the preparation of the food and with reference to the character of the food material itself, for example, if the food is one which it is desired to preserve intact inform and flavor, and which is already comparatively soft, a quick boiling or baking would be preferable

methods, if, however, the article is one dry or hard in character a prolonged process of simmering or stweing would be best. If again it is desirable to extract the juices and flavors of the food stewing is also the preferred method. The rapidity of the process employed in cooking must likewise be determined by the character of the food material, for most foods of large bulk, or foods into which a large amount of moisture must be incorporated, or foods from which the flavors or juices are to be extracted, slow cooking is best.

The elements of which a food is largely composed must also be governed somewhat by the method employed in its cookery, it being necessary to subject foods largely composed of albumen to a much less degree of heat to cook properly than articles largely composed of starch. This fact again emphasizes the importance of a knoweldge for all cooks and housekeepers of the elements which enter into the composition of the different articles most commonly used as foods. Different effects upon foods are produced by the use of of hard and soft water. Peas and beans put to cook in hard water cantaining lime or gypsum will not become tender because these chemicals substances harden vegetable casein of which element paes and beans are largely composed. On the other hand many vegetables are completely spoiled by cooking in soft water which more readily penetrates the tissues.

The temperature of the fluid in which to begin the cooking of food must be governed by the elements of which the food is com-

posed and the result it is desirable to attain in its cooking. The kind of fluid to be used in cooking whether milk or water, should be somewhat determined by the elements of which the food is composed, for example, foods largely composed of starch if cooked in milk, form a more nearly correct food than does the same article when cooked in water. Cookery has been too long looked upon as a mere mechanical process and the notion has prevailed that any one could readily learn to cook if only they were fortunate enough to be able to purchase a good cook book. Ignorance of the principles involved is the cause of much of the poor cookery of the present day. With a thorough knowledge of the underlying principles added to that deftness secured by careful practice in the art, the cook will find the time and labor needed to supply the daily table to be far less and less laborious than when undertaken with no knowledge of the why and wherefore of the different processes involved. Notwithstanding its importance do not let it be considered by any means the chief end and aim of existence, as it sometimes seems to me, the preparation and eating of food is so considered. I know women whose one idea during the first half of the day is to prepare a dinner to please the fastidious tastes of their families; for this end they work, plan, ponder and contrive, and when that is over the all absorbing thought seems to be what shall be prepared for the next meal.

Let simplicity be the end sought in the cookery of food since as a rule the simplest food is the most wholesome. Variety is necessary; that is, a judicious mingling of grains, vegetables and fruits, since too much sameness ~~xxxxxxx~~ cloys the appetite. But

there is a marked tendency to furnish our tables with too great a variety of complicated dishes.

Among the simplest and most easily prepared foods are the grains. No class of foods excel these in nutritive value, and when properly cooked and served, they please the palate and are easy of digestion. The proportion of carbonaceous elements required to sustain the body perfectly in comparison with the nitrogenous elements should be that of seven to one, and this nice balance is found in wheat, while oats, barley, corn and other cereals very closely approximate it. In contrast with the grains examine the constituent elements of lean beef, which have seven times as much of the nitrogenous elements as of the carbonaceous--the reverse of the true order. The grains contain from eighty-five to eighty-seven per cent of nutriment, while lean beef has only twenty-eight per cent. The value of the grains thus being established, the next thing is to secure their proper preparation fortable use.

There are three principal reasons why the grains as ordinarily served do not agree with delicate stomachs. First, they are not properly cooked; second, they are soft and can be swallowed without mastication, which is freqnently done; third, they are heaped with sugar, which is ready to set up the process of fermentation as soon as it reaches the stomach. To obviate the first difficulty, be sure that all grains have a long slow cooking, so that the digestive organs will not be taxed in trying to dispose of half raw starch. Second, let the grains be eaten with hard crackers or

dry bread, so that proper insalivation shall be secured. Third, serve entirely without sugar. Nice cream is a sufficient dressing; or, instead of cream, fruit juices or sauces prepared from fruit juices.

Starch constitutes about one-half of the food elements found in the grains, and this, by the first process of digestion is converted into sugar of a kind which nature can take care of perfectly, so why should an extra burden of cane sugar be added merely to please the palate. After a little time nearly every one who tries the experiment prefers as a matter of relish that sugar should be omitted.

A double boiler of some sort is the most desirable article for the proper cooking of grains.

To make the lessons effective it is necessary to place upon the blackboard the following list of foods which may be prepared of fruits and grains.

1. Wheat with steamed apples,
2. Wheat with raisins,
3. Wheat with dates,
4. Wheat with chopped figs,
5. Wheat with fresh fruits and berries,
6. Wheat with lemon sauce,
7. Farina with fig sauce,
8. Graham grits with raisins,
9. Graham grits with dates,
10. Molded wheat with fruit sauce,
11. Molded grits with fruit sauce,

12. Graham mush with dates,
13. Plum porridge,
14. Graham apple mush,
15. Graham peach mush,
16. Graham grape mush,
17. Graham blackberry mush,
18. Molded farina with cocoanut or fruit sauce,
19. Farina with bananas,
20. Rice with fig sauce,
21. Rice with lemon,
22. Rice with peaches,
23. Rice with oranges,
24. Rice with tomato gravy,
25. Rice with lentil gravy,
26. Molded rice with fruit sauce,
27. Granola fruit mush,
28. Raspberry granola mush,
29. Granola apple mush.

GRAIN.

TABLE OF PROPORTIONS FOR COOKING GRAIN IN A DOUBLE BOILER.

	quantity Grain.	Water Required.	Hours to Cook.
1 Whole Wheat	1	5 parts	6 to 8
4 Cracked Wheat	1	4 1/2	3 to 5
5 pearl Wheat	1	4 "	4 to 5
7 Graham Grits	1	4 "	3 to 5
8 Rolled Wheat	1	3 t"	3 to 6

9	Rolled Rye	1	5 "	3 to 4
16	Rolled Oats	1	3 "	3 to 6
6	Oatmeal	1	4 "	3 to 6
2	pearl Barley	1	5 "	4 to 5
3	Hominy	1	5 "	6 to 10
11	Ceraline	1	1 "	1-2.

613.2

What to cook is one of the serious problems of the age. It has always been considered a more or less perplexing one, generally solved , however, by providing whatever happened to be most conveniently obtained or best pleased the palate with but little or no thought as to whether the articles served were well suited to fulfil the real purpose of food in the maintenance of perfect health. Quite too many meals partake of the characteristics of the one before which an itinerant preacher in the South sat down and was asked to say grace. After surveying the repast before him composed of a great variety of indigestible viands he laconically remarked that the "meal was not worth blessing."

Stock breeders and cattle raisers have long made the food of their animals a subject of study and with great profit but food for human beings has received far less consideration from a scientific standpoint. Its selection has been largely left to chance and its preparation looked upon as a menial service too often relegated to ignorant girls having not the first conception of what constitutes healthful food, although they may be able to go through the mechanical process of putting together various material. But this is not enough. The proper preparation of food involves both chemical and physical processes which necessitate careful thought and a thorough understanding of scientific principles to insure success while in the matter of the selection of food material a knowledge of the nutritive value of different foods, of their digestibility of their probable wholesomeness and adaptability to the needs of the user is of the

utmost importance. These essential points we shall aim to study as carefully as possible during this course of lessons in connection with the various foods under consideration. To aid us in this we have upon this chart which has been compiled from the most reliable scientific authorities both in this country and in Europe an analysis of many of the most common foods in use showing the kind and amount of the essential food elements composing each. These food elements are for convenience generally classified according to their chemical composition into three classes nitrogenous, carbonaceous and inorganic some or all of which are to be found in all foods. Beside these, most foods contain more or less water and more or less indigestible material. To aid us in studying foods as regards their constituent elements we have upon this chart an analysis of most of the common foods in use.

Each of these different classes of elements have a special particular work to perform in the maintenance of health so it is especially necessary that our food should contain some of each kind. It is likewise essential that these elements be supplied the system in certain definite proportions. More of the carbonaceous than of the nitrogenous is needed. One part nitrogenous to seven of carbonaceous is a very good proportion.

613.2

COOKERY.

It is not enough ~~to provide~~ be provided good and proper food material; it must have such preparation as will increase, ~~rather than lessen~~ and not diminish, its alimentary value. ~~Poor~~ The unwholesomeness of food is quite as often due to bad cookery as to poor selection of material. Proper cookery ~~ought to make~~ renders good food more digestible. ~~Properly done~~ When scientifically done, cooking changes each of the food elements, with the exception of fats, in much the same manner as do the digestive juices~~;~~ and at the same time ~~it~~ breaks up the soluble portions of food, so that they are more readily acted upon by the digestive fluids. Cookery , however, often fails to attain the desired end~~;~~ and the best material is rendered useless, and unwholesome, ~~and even dangerous~~ by improper preparation. Poor cookery ~~is far oftener~~ has come to be almost the rule rather than the exception~~;~~ ~~and~~ it is rare indeed to find a table upon which some portion of the food is not rendered unwholesome , either by improper preparatory treatment, or by the addition of some deleterious substance. This ~~is often~~ is doubtless owing to the ~~fact~~ reason that in ~~so~~ many homes the cooking is intrusted to an ignorant class of persons having no knowledge whatever of the scientific principles involved in this most important and practical of arts. A cook needs as much intelligence concerning her work, and requires as thorough education for it, as ~~a~~ does the statesman for the requirements of her office; and we might add that her calling is ~~one fully~~ as noble and ~~quite as~~ responsible~~;~~ for upon the results of her work largely depend the health and physical welfare of the family circle. ~~It has been aptly said that~~ The evils of bad cookery and ill selected food are doubtless as great as the ~~evils of~~ those arising from the use of strong drink, ~~and it might well~~

(2) that cooking is such an every day affair its importance has been overlooked and all consideration centered upon the labor necessitated for its performance which has been looked upon as a menial service merely and undertaken with no thought of the consequences involved save to produce something that would taste good and gratify the palates of those who ate it, as ~~well as~~ also to the fact

~~1 Starch sugar boiled or baked for a long time being converted into sugar, cane sugar when boiled long changed to grape sugar and at length by the prolonged action of heat converted into peptones ~~when they are acted upon by the digestive fluids.~~~

It is one of the strange things of our ethics that women who would not think ~~no consideration~~ of trusting the care of their fine china and brick a brack to ~~their~~ their unskilled hands would hesitatingly entrust the preparation of their daily food ~~to~~

6/3.2

(To put in packages)

IMITATORS AND IMITATIONS.

We are the originators, inventors, and discoverers of the Battle Creek health foods. Multitudes of irresponsible imitators who know nothing whatever of the science of dietetics or the essential principles which must be recognized in the manufacture of health foods have swarmed down upon the city of Battle Creek and are exploiting the health food idea in every way, by the aid of every device which seems likely to attract the attention and deceive the innocent public.

These imitations may be readily recognized by their pyrotechnic methods, their extravagant claims, and the unscientific jargon which they send forth about their wares and the pictorial names which they choose for their products. The last feature recently attracted the attention of our worthy contemporary, the editor of the Northwestern Miller, who relieved his feelings thus: ".....

A few weeks ago, in the Chicago Record-Herald, an interesting cartoon appeared, by the famous cartoonist, Mr. J. Mc Cutcheon, which presented in a very realistic and true-to-nature manner the true situation as regards the health food industry as it has existed at Battle Creek for the last year or two. A number of newspapers, recognizing the aptness of the artist's representation, shortly after the appearance of the cartoon, republished it for the benefit of their readers. We take pleasure in reproducing it here to be sure that all

who are at all acquainted with the situation will at once recognize the shrew wit and keen satire of the artist who is certainly a genius in this line.

LOOK BEFORE YOU BUY.

Before purchasing a package of so-called health food, even although it may claim to be from Battle Creek, take time to look at the bottom of the package and find the name of the manufacturer. If you do not find the name of the Battle Creek Sanitarium Food Company or the Sanitas Nut Food Company, Ltd., pass it back and call for the original and genuine Battle Creek health foods.

(Put ad. across both columns).

We give below a brief explanatory summary of the Sanitas food products. These foods which are wholly unique and original with us, although but a few years have elapsed since they were first presented to the public, are now more or less known in all parts of the civilized world.

Each food has a special raison d'état; each has a specific purpose and has been created to meet a specific need. Each one may be relied upon to be and to do exactly what is claimed for it. None of these foods were originally made to sell as commercial products. They were made to meet the needs of various classes of invalids, and are presented to the public only in order that those who need them may have an opportunity to partake.

OUR NEW COVER DESIGN.

How Do You Like It?

It pleases us immensely. The Indian and the squirrel are two splendid illustrations of the value of nuts as a food. Note the agility of the squirrel as he leaps from limb to limb, from tree to treex. What marvelous strength of limb, what wonderful rapidity of movement! Its diet of nuts affords the purest and most concentrated nutriment. This is the secret of the squirrel's activity and abounding life.

Note the endurance of the wild man of the forest. After four hundred years of oppression and subjugation by the white man, with numerous odds against him, the Indian still exists and largely because his ancestors were nut-eaters, subsisting wholly upon the natural products of the forest. An old Indian died a few weeks ago in California at the advanced age of more than one hundred and forty years. He was a nut-eater. This was the secret of his long life.

The squirrel and the Indian represent, respectively, the vitality and activity on the one hand, the strength and endurance on the other, which are unquestionably promoted by the use of nuts more than any other food.

DONT BE FOOLED.

For several years back parties have been going all about the country introducing various sorts of cereal substitutes for coffee under different names, and an increasing variety of cereal products, claiming in many instances that their wares are genuine Battle Creek Sanitarium health foods, and claiming that they were originated or are used at the Battle Creek Sanitarium.

Everybody has heard of the Battle Creek Sanitarium and knows that it stands preeminent as a scientific exponent of dietetics, temperance, and various good reforms, and this fact has opened the doors of many homes to various nefarious foodstuffs, some of which are scarcely fit for cattle feed. The only genuine Battle Creek Sanitarium health foods are those manufactured by the Battle Creek Sanitarium Food Company and the Sanitas Nut Food Company. None others are used at the Battle Creek Sanitarium, nor endorsed by its managers. Dont be deceived by the delusive representations of imitators. Call for Battle Creek Sanitarium Health Foods and note the name of the manufacturers.

CHEAP FODDER.

There was never a time when so much cheap food was going into the American stomach, advertised as breakfast foods, under various alluring and fascinating names, as at the present time. Some of these which are extolled to the very skies and are claimed to be the equivalent of many kik times their weight in any other food, are the cheapest sort of stuff, consisting, in fact, of cheap flour, mixed with grain malt, and raised with large quantities of yeast, daubed with glucose or some other cheap sweet stuff, dried and ground. There is quite a number of brands of these cheap sweet stuffs which appear in the form of dark colored granules, the merits of which are about equal, excellent food for swine or calves, but no more worthy of being regarded as a health food or a scientific food preparation than bran mash or sour krout.

(For letter-head)

Our goods are the original and genuine Battle Creek health foods. Beware of cheap and harmful imitations.

615.2

Star page 2.

Battle Creek health foods first made for Battle Creek Sanitarium patients.

a. Twelve food factories engaged in manufacturing Battle Creek health foods in different parts of the world.

b. Promoters, pirates, and unscrupulous imitators.

c. Seeking to reap where they have not sowed.

d. The products which they turn out are made to sell, and cannot be in any sense whatever termed health foods, while some of them are absolutely pernicious.

e. Commercial foods.

f. (Heading) Spies and Bribe-Takers.

g. (Heading) Beware of Imitators.

h. This is a dodge which closely resembles the sneak-thief, who, after he has picked a pocket, shouts "Stop thief!" and starts off on a dead run after some innocent fellow in the hope that thereby he may detract attention from himself.

j. Willful misrepresentation.

k. It is certainly in place for us to say a word of protest against the wholesale deception of the public which is being practiced in all parts of the world.

l. (Heading) The Only Genuine Battle Creek Health Foods.

(Heading across two columns, Cheap Foodstuffs)

613.2

For back side of cartoon.

PROMOTERS, PIRATES, AND UNSCRUPULOUS IMITATORS.

Every good thing has a counterfeit. No one would ever take the trouble to imitate a poor thing. The Battle Creek Sanitarium health foods and the processes of making them were invented by a scientific physician whose researches in this line began more than thirty years ago. At first, the public derided, but multitudes of despairing dyspeptics were cured, and the rosy cheeks and rotund figures of those who had been healed silenced the scoffers and won for the foods such popularity that unscrupulous men soon recognized the possibility of speculating upon the reputation and prestige of the Battle Creek Sanitarium food ideas. The consequence has been the organization of twenty or thirty food factories in and about the City of Battle Creek, nearly all of which are devoted to the manufacture of articles more or less resembling Battle Creek Sanitarium foods; but none in any respect equal to those of the original manufacturers.

These foods are sold about the country as Battle Creek Sanitarium health foods, and probably the majority of those who eat them think they are eating foods which at least have the endorsement of the Battle Creek Sanitarium. Many of the parties engaged in this business have obtained their information by illegal and illegitimate methods. In some instances the Court has put a stop to these piratical operations by perpetual injunction. Legal procedure has been instituted in the cases of several others.

It is well that the public should know that all persons who are engaged in the manufacture of thoroughly cooked

cereal flakes are infringers of the original patents under which Toasted Wheat Flakes, Granose Flakes, and other flake foods,manufactured by the Battle Creek Sanitarium Health Food Company and the Sanitas Nut Food Company,are made. All parties engaged in the manufacture of sale of these infringing products are liable to legal prosecution.

The cartoon on the opposite side of this sheet, drawn by McCutcheon, one of the most famous cartoonists of the day, is a graphic but scarcely overdrawn illustration of the manner in which the piratical food-concerns have obtained what little information they possess concerning the manufacture of health foods, and the unscrupulous methods which these firms are capable of adopting.

The Battle Creek Sanitarium Health Food Company and the Sanitas Nut Food Company are the originators of the Battle Creek Sanitarium food ideas, and the health foods which are manufactured by these concerns are the only ones which have the endorsement of the Battle Creek Sanitarium and its management, and the only ones which have through the medium of this institution and its branches acquired a world-wide celebrity and given to Battle Creek its reputation as the center of practical and progressive ideas in dietetics. When you buy Battle Creek foods, be careful to see that each package bears a picture of the Battle Creek Sanitarium or the word "Sanitas", the trade-mark of the Sanitas Nut Food Company.

113.2 ad

(Ad. for Good Health)

PAN-PEPTOGEN.

A Remarkable Food-Remedy for Indigestion.

Pan-Peptogen is the result of twenty-five years' experience and hundreds of experiments upon animals, and embodies the combined results of the labors of many eminent scientists who have devoted themselves to the study of the problems relating to the digestion and its disorders.

Pan-Peptogen is not a digestive agent. It does not relieve the stomach of any work which it is naturally required to do, but it supplies the stomach with the subtle substances which it requires to enable it to perform its work readily and efficiently.

Pan-Peptogen, when properly used, increases the digestive power of the stomach from 200 to 600 per cent, and in many cases even more. Pan-Peptogen is without question the most efficient and remarkable food-remedy for digestive disorders which has ever been discovered. It is used in the leading Sanitariums of the country and has proven its merits in hundreds of obstinate cases which had resisted other measures.

Pan-Peptogen is not a medicine; it is food, but is at the same time far more powerful as an aid to the stomach than any medicine known.

Send ..... for sample, and literature giving further particulars to

PAN-PEPTOGEN COMPANY,

Battle Creek, Mich.

PJ.

613.2

(Advertisement)

PAN-PEPTOGEN.

The Greatest Remedy for Indigestion Ever Discovered. Experiments show that this remedy increases the digestive power of the stomach to an enormous extent. Pan-Peptogen does not digest the food, but enables the stomach to form a very powerful and active gastric juice.

Pan-Peptogen is a natural remedy, superior to pepsin and all other artificial digestants.

Address,

PAN-PEPTOGEN COMPANY,

Battle Creek, Mich.

HEALTH CHOCOLATES.

Everybody likes chocolate but ordinary chocolate often causes indigestion, and besides, produces sick headache, rheumatism, and various nervous disorders because of the theobromine which it contains. After many experiments we have succeeded in producing a health chocolate, which so closely resembles the real chocolate that it is readily accepted in its place, furnishing all the flavor and other agreeable qualities without the poisonous active principle to which the injury arising from the use of ordinary chocolate is attributable.

For sample, address

SANITAS NUT FOOD COMPANY,

Battle Creek, Mich/

613.2

(New ad. for health candy)

HEALTH CANDY.

A New Idea.

Everybody knows that ordinary candy is unwholesome, producing decay of the teeth, catarrh of the stomach, and variour other disorders and discomforts. Our health confectionary is free from all these objections. It has all the delicate toothsomeness of ordinary candy with none of its unwholesome properties.

Our cocoanut cream caramels are delicious; our malt honey chocolates are exceedingly toothsome. Send for samples.

COCOANUT CREAM.

The most delicate and toothsome of fats. Made from fresh cocoanuts. Altogether different from the cheap cocoanut fats made from copra. Easily digestible, delicate in flavor, a perfect substitute for butter and all animal fats. Send for sample. It will surprise you.

COCO-MELTOSE.

A combination of cocoanut cream and malt honey. Wonderfully delicate, toothsome, and satisfying. A delicious substitute for table butter, shortening for pastry, and similar purposes. Melts in your mouth. It reminds one of butter and honey but is more delicate. It is good. Try a sample.

(Run two letters)

Dear Sir (or Madam):--

We wish to call your attention to our antiseptic charcoal tablets. They are not medicine, but a rational remedy. They are beneficial in all forms of indigestion which are due to germs, such as biliousness, catarrh of the stomach, intestinal catarrh, foul tongue, flatulence, chronic diarrhoea, etc. They clear the skin from pimples by preventing the formation of poisons in the stomach and bowels, which is the cause of pimples as well as many other forms of skin eruptions.

Send 4 cents for a nice sample, or send us the names of six persons who ought to be informed of the merits of these tablets, and we will send you a sample free. Just write these names and addresses plainly on a postal card , and say, "Send literature about charcoal tablets to the following addresses," and we will send you the sample at once.

Star, for circular letter.

and please note that Pan-Peptogen is not an untried remedy but one which has the backing of the highest scientific authorities of this country and Europe. It is used in the leading Sanitariums of the country, and has proved of great servicex in numerous extremely obstinate cases of gastric disease. If you are suffering from hyperpepsia, hypopepsia, slow digestion, or any similar ailment, you will be thoroughly pleased with the results if you give Pan-Peptogen a trial, providing you follow the directions carefully.

Star, for blue letter.

(a) the Battle Creek Sanitarium and its branches. (b) Battle Creek Sanitarium and its branches in various parts of the world. (c) rheumatism, neurasthenia, cancer, and many other diseases.

(For card to enclose in letters)

Picture of the Sanitarium on one side, description of new building on the other.

(For booklet)

Sanitas Dainty Delicacies for Children and Adults,
for Babies and Old People, for the Sick and the Well.

Put this on cover; get it up in antique style. On last page put reduced picture of the Indian and squirrel.
On title page, put "See our special propositions, page ...."
Put in different cereals, and then put in several $5.00 propositions.

(To go with booklet)

Take article in the "Food Ideal" and the cartoon.
Print on half-tone paper. Get up in colors, on two pages.
Put on backside statement about imitators.

Star for "Food Idea."

In bold type ---

GRANOSE IS A CAPITAL FOOD-REMEDY FOR CONSTIPATION.

613.2

Sanitas

FACIAL BLEMISHES.

Pimples and red blotches produce a most unsightly appearance and often render the possessor of such blemishes very miserable. If your face is in this condition, it is important for you to know that you may easily be cured. Here is the way : Bathe the face in very hot water for 5 or 10 minutes twice daily; discard the use of meats of all sorts (fish, flesh,aand fowl) and substitute the Sanitas Company's protose; give up the use of tea and coffee and use Caramel Cereal instead; discard butter and use instead the Sanitas Company's nuttolene or cocoanut cream, a most delicious and entirely wholesome product; use malt honey in the place of cane-sugar.

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Caramel Cereal

SICK HEADACHE.

Do you suffer from sick and nervous headache? It is probably caused by the habitual use of tea or coffee. Dr. Haig, of England, says that flesh foods also cause sick headache, and in some cases the free use of milk produces headache. Hundreds of persons cure themselves of sich headache by substituting Caramel Cereal for tea and coffee, discarding meats of all sorts, and substituting in their place Sanitas nut food products. Try a change of diet, get a little more exercise out of doors, keep the bowels open by means of a daily enema of cool water (75°), and you will be well pleased with the result.

613.2

NOTES FOR ADDITIONAL WRITEUPS.

Embodied in the following paragraphs are facts and idea which can by varying the method of statement be woven into a large number of reading notices. I indicate simply a suitable heading and the bare facts connected with it:

THE USH ERA.

The manufacture of oatmeal was introduced into this country about fifty years ago. Cracked wheat and similar preparations followed. The whole population began eating mush. Result: amylaceous dispepsia, universal sour stomach, constipation, disordered livers, thin blood, weak muscles and nerves, brain fag and nervous exhaustion. Remedy: Dextrinized foods, best represented in TOASTED WHEAT FLAKES.

OATMEAL MUSH AND DIABETES.

Dr. Pavy, of England, has shown that diabetes is due to an imperfect digestion of carbohydrates in the stomach and small intestine, and the absorption in the blood of a large quantity of imperfect starch digestion. It is impossible for the stomach to digest cereal foods, taken in the form of mush, in which the starch is less than half cooked. This is one of the reasons why diabetes is becoming so common in this country of the British Islands. French physicians long ago discovered that toasted bread and dextrinized starch is an excellent remedy in diabetes. Best of all is TOASTED WHEAT FLAKES, etc.

MUSH MALADIES

For a long time we have had gin liver tobacco cancer, tea drinkers disorder, coffee drinkers complexion, and we now have the mush malady, commonly known as starch indigestion or amylaceous dyspepsia, which may be fairly attributed to the extensive use of oatmeal mush, cracked wheat and other pasty foods, which, taken into the stomach, are not well digested, but ferment instead, forming acids and poisons which irritate the ~~stomach~~ small intestine, congest the stomach and liv r, impoverish the blood, irritate the nerves, weaken the muscles and sap the vital energies, inducing neuralgia or nervous exhaustion, constipation, diabetes and other disorders. Remedy: Use dextrinized foods, granola, granose, granut, especially TOASTED WHEAT FLAKES. Sanitarium picture etc.

AN IMPORTANT DISCOVERY IN DIETETICS.

At the Battle Creek Food Laboratory researches in foods and dietetics have been going on for more than a quarter of a century, conducted by skilled physicians and thoroughly trained chemists, including experiments made on animals, and very extensive experiments on human beings, conducted by enthusiastic students and nurses. One of the most interesting discoveries is the importance of dextrinizing the starch as a means of preventing and curing various forms of indigestion, especially acidity, gastric catarrh, constipation, biliousness, brain fag, nervous exhaustion, rickities in children, weak muscles in adults. As a result of thousands of experiments a few choice foods have been produced, which have been more or less immitated: Granola, granut, granose, especially TOASTED WHEAT FLAKES, etc.

FOOD OF THE CANARY ISLANDERS

The Canary Islanders are among the most healthy and hearty people in the world. They live on gofio, which consists of parched or dextrinized wheat and corn, made by preparing the corn in the ~~xxxx~~ iron kettle over a fire. This food they call gofio. They grind the parched corn and eat it, mixed with water. Attention was first called to this food by an eminent physician visiting the Canary Islands, who was cured of chronic dyspepsia by eating gofio. A prominent Chicago physician lived on gofio for many years, which he obtained from the Battle Creek Sanitarium, where it was formerly used in the treatment of various digestive disorders. By an important discovery a great improvement was made in the preparation, which is now known as TOASTED WHEAT FLAKES. Its use cures indigestion and cronic constipation. It is designed to take the place of mushes.

THE FOOD OF THE ROMAN SOLDIER.

The grand old warriors who won victories for ancient Rome, subsisted chiefly on wheat, which they carried dry in their knapsacks and parched and browned when needed for use. In all wheat growing countries this grain has been the staff of life. Its value has been greatly depreciated in this country by modern processes of milling, whereby the choice elements have been removed to be fed to hogs and cattle. Many have sought to remedy the evil by eating cracked wheat in the form of mush. In this form the starch is less than half cooked. The result is indigestion, heaviness, acidity, aenemia, constipation, nervous prostration, brain fag, weak muscles, rheumatism and other maladies. To furnish complete nutrition, the whole grain must be eaten. By a fortunate discovery, wheat is presented in a form inviting both to the eye and palate in TOASTED WHEAT FLAKES.

(Describe, etc.)

EATING FOR STRENGTH.

The best way in which to recruit one's strength is not in eating the flesh of the strong animal as when feeding upon beef steak, but in going to the same source from which the strong animal derives its strength, namely, the vegetable kingdom. The best muscle food is starch, not albumen. Starch is stored in the muscle as glycogen, which under the stimulus of nerve impulses sent out from the brain, explodes in muscular movement, hence the cereals are the chief source of muscular energy and the favorite food for working men and working animals the world over. Meats of all sorts lessen endurance by filling the blood and tissues with uric acid and other poisons. Pie, pickles, gravies, sauces and condiments are trash, not food. Starch or cereal foods in the forms of mushes are indigestible because imperfectly cooked. Thorough cooking of the cereals requires a temperature of 300 degrees or more, sufficient to brown the dextrines of starch.

(Granola, Granut, Granose, TOASTED WHEAT FLAKES. Describe the latter, etc.)

A FOOD CURE FOR CONSTIPATION.

Constipation is an almost universal disease among civilized nations, due to concentrated and imperfectly cooked food. Mushes, milk, fine flour bread and condiments, added to sedentary habits, result in constipation, hemorrhoids, piles and other diseases of the rectum, requiring surgical operation, intestinal catarrh, headache, bilious attacks, nervous exhaustion, insomnia, sleeplessness, auto-intoxication and paralysis. Remedy, daily use of TOASTED WHEAT FLAKES, almost unfailing.

DEXTRINIZED FOODS.

The term so commonly used, the meaning should be explained to the public. ~~While~~ Saliva acts upon the starch in the process of digestion, ~~starch~~ and is first converted into dextrine then into sugar. The process of dextrinization is a sort of ascending scale. The dextrine is first formed, being changed as the process advances, into higher dextrines, which are later changed into still higher forms of dextrine, so on through thirty or more steps, until sugar is finally reached. The best obtained by the boiling of most cereals is a dextrine of the lowest grade, mixed with unchanged starch. A temperature of 300 degrees changes the starch and low dextrines into dextrines of the highest class, as shown by the higher color. When browned dextrine is brought into contact with the saliva or other digestive fluids, the transmission into sugar is instantaneous, while a long time is required to raise the low forms of dextrine through the thirty different steps into sugar. This explains why dextrinized foods can be taken by persons who suffer from indigestion and can not eat starchy foods, the most numerous of all classes of dyspeptics.

TOASTED WHEAT FLAKES represents a thoroughly dextrinized cereal food. TOASTED WHEAT FLAKES ~~are~~ is the original dextrinized cereal food, and all similar products are inferior imitations, which can be readily seen by comparison. Every package of the genuine article bears a picture of the Battle Creek Sanitarium.

ATE HIMSELF IN A MONTH.

As an old German proverb runs, a man is made of what he eats. Every healthy human being eats an amount of food equal to his own weight about once a month, thus a man eats himself once a month. It is of the highest importance that the material out of which the body is made shall be such as can be converted by the organs of nutrition into sound, healthy tissues. It is as impossible to make good brains, nerves, muscles, blood and bones out of the spices and greasy messes, fried foods, pastry, ices, gravies, sauces, fragments of animal viscera such as tripe, fricassed liver and kidney, devilled calves braines, etc., as to make solid and enduring walls out of mud and refuse. A few sound brick or solid stones might be built into such a wall, but it would be nevertheless a weak structure, which would quickly succumb to the action of the wind or the elements or any considerable strain. The body, like a wall, is a structure--the materials which enter into it must be sound to secure vigor and endurance. Cereals, legumes and nuts furnish the most highly concentrated food stuffs. Cereals when properly prepared are the most easily digestible of all, though in the form of mushes, which are commonly used, they are indigestible and dyspepsia-producing, absolutely unfit to eat and should be scratched off the bill of fare, and well dextrinized cereals substituted, as Granola, Granut, Granose, TOASTED WHEAT FLAKES, etc. (Describe the latter.)

HOW TO HAVE A GOOD WIND.

Hunters invariably withhold meat from their hunting dogs, feeding them upon dry bread, cornmeal mush and similar foods. When asked the reason for confining ~~their~~ hunting dogs to such a diet, an experienced huntsman replied: "Meat spoils their wind and destroys their keeness of scent." Dr. Baeltz, a German physician practicing in Japan, observed the same thing with reference to Japanese runners. The coolies who carried him lived on rice and beans. He gave them beef steak. After three days they refused to eat more, declaring it made them tired. Best of all muscle feeding foods is dextrinized cereals, Granola, Granut, Granose, especially TOASTED WHEAT FLAKES, ready to serve at once.

ANTI-URIC ACID DIET.

The greatest scourge of modern civilization is uric acid, pronounced by a French physician to be the worst of all poinsons to which the human family is exposed. Chittendon, of Yale, and other eminent chemists, ~~have~~ has shown that uric acid is derived largely from the food, especially from beef steak. It is not found in milk or eggs or any vegetable foods, but it is present in great quantities in the juices of flesh foods of all sorts. The chief constituent of animal extracts and broths is uric acid. According to late discoveries, uric acid produces apoplexy, rheumatism, Bright's disease, and premature old age through arterio sclerosis, or hardening of the arteries, which is caused by uric acid. These diseases are multiplying among Americans because of their excessive use of meat. People have been driven to this by the gastric miseries resulting from the use of oatmeal, cracked wheat and other cereal mushes. The remedy is to be found in the use of dextrinized cereal foods, such as brown rice, Zwieback, Granola, Granose, Granut and TOASTED WHEAT FLAKES, the latest and finest product. ~~(Describe)~~

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FORMULA FOR MAKING DEXTRINE.

Starch mixed with four times its weight of water at 50° temperature, then gradually raised to 65-70°, and 2% of malt added with continuous stirring. The temperature further raised to 73° and kept at that point until a portion of the solution cooled does not become blue with the addition of iodine but reddish violet; then temperature rapidly raised to boiling point, then afterwards cooled, filtered, and evaporated.

The above temperatures are centigrades.

613.2

Adulteration of food.

(T. Rose)

(Vegetarian Rundschau.)

Adulteration of food.

The adulteration of food is carried on very extensively in our times and according to all outward appearance is increasing continually notwithstanding all strict measures trying to prevent it. This evil is by no means of modern origin, on the contrary we can trace it back to the middle ages. In our times the methods as well as adulteration itself have increased considerably and the practice of the same becomes from day to day more and more frequent.

If we inquire after the causes of this so extensive evil, we will find, that its originates mostly from the most regardless greediness and self-interestedness of mankind.

One tries to sell his goods by cheaper production as much to his own advantage as possible, the other tries to buy as cheap as possible good articles. In this mutual endeavor and guided by the central-idea of commerce and trade, to ~~enrich themselves~~ become rich at the

expense of others, has gradually formed itself some kind of dishonesty in the mercantile world, which aims to unite cheapness with apparent good quality and correct, honest measure, in order to increase the profit ~~gain~~ at the disadvantage ~~expense~~ of the ~~buy~~ buyer and to the advantage of the seller.

With the increase of the knowledge of natural bodies, the chemical and physical powers and their practical application in life, the system of adulteration in the manufacturing as well as mercantile world have increased to ~~reached~~ a considerable extention ~~and~~ in variety as well as skill and dexterity, that it has become almost an impossibility the genuine from the adulterated. ——

Another cause we may find yet in the circumstance, that the value and quality of the customary and usual food are not subjected to any criticism. It would not be difficult to prove, that exactly the old, customary and common mode and way of preparing food causes adulteration and

or at least promotes and favours it. The inclination of the public to listen to charlatans and quacks, has created a large field to adulteration and all new, catching names, ~~and~~ glossy etiquettes and advertisements of all kind — and we know that the God of advertisements in our times is very ~~po~~ powerful —, support it most energetically and strongly. ——

The question, when may we consider the goods and merchandise adulterated, is a quite difficult one. In general we may apply the following rules:

1) If they contain strange, extraordinary substances, which increase their weight, volumen and strength or bestows upon them an apparent value, which they in reality do not possess.

2) If they contain substances, which ~~are~~ may be dangerous to the health of mankind.

3) If their normal element is partly or entirely missing

4) If they are imitated to represent the original or are sold under the name of different merchandise.

For certain goods is stipulated in general a certain value; f. e. butter must contain 80% butter-fat, vinegar not less than 3% acid of vinegar. According to this butter with 70% butter-fat and vinegar with 2% acid of vinegar must be considered adulterated.

It can therefore be clearly seen, that goods, which go through the hands of many negotiators or brokers before they reach the consumer are liable to be more adulterated than others. and even today at the modern way of production and the quick growth of larger cities, the management of food-products is mostly in the hands of retail-dealers. We should therefore take care and pain to buy, if possible, the goods en gros. — ~~and~~ The larger and the more essential the changes are, which natural products as fruit, flour etc. have to undergo in preparing the manufactures, which are made ~~out of~~ from the same, the more numerous and coarse are also the adulterations, which are applied to these manufactures. We are much better protected against adulteration, if the manufactures in their

preparation retain their natural form and quality. —

The chemical-analytical methods, which have been applied in order to discover adulterations, are very numerous. Some are very easy and simple, that they may be carried out by police-officers, but others are so difficult, that even an experienced chemist sometimes is not able to discover an adulteration. By the analysis of wine f.i. often the most accurate analysis offers a very small hold for a decision. Although we are able to determine the contents of alcohol and sugar, the quantity of acid and salt of a suspicious wine and are able to say in general, how much of the above mentioned substances this or that wine must contain, ~~but at~~ it is still impossible to assert or to affirm, whether this or that wine is a natural product or not. The artificial colour of the wine on the other hand can easily be recognized, because Chemistry as a science possesses ways and means to prove exactly even the smallest part of such colouring. —

To prevent this grave misdemeanour, ~~to~~ different laws have been established. Punishable are: the imitation and adulteration of food for the purpose of defrauding in commerce, the offering for sale of spoiled, adulterated fruit or for the purpose of defrauding falsely marked ~~fruit~~ or named food. The number of convictions nevertheless is very small compared with the number of detected adulterations. We have not to look for the cause and reason of these striking facts in the circumstance, that ~~the fact of~~ the adulteration itself is doubtful, but in the fact that a number of ~~pending~~ cases are yet pending in the courts and a judicial settlement has not been reached yet.

The poorer classes of people have to suffer most from adulterations. As a rule they have to use food of inferior quality, which not only sometimes are worthless and distastful, but often even as much as hurtful. It should therefore be clear to everybody, that the adulteration of those means of subsistence,

without which the poorest cannot exist, should be punishable to the highest extent. ——

The introduction of stations, where food, its genuineness and purity are tested, has been found very effective against the system of adulteration, because anybody may have his purchases examined by paying only a small fee for it. The mere fact, that there exists such an institution, the fear of being found out, ~~are~~ is a very effective ~~means against the~~ preventive against adulteration.

In order to protect ourselves for adulteration of substances of food, we may select different ways. First of all we should spread as much as possible a correct knowledge of food and substances of food. We should select our food as much as possible from the natural products of the Country, in which we live, because we know them there in their natural state and it is much better, when they are preserved in their natural form and quality. We should only use foreign products, if we know, that they are not spoiled and

not adulterated. In many spiritous liquors, cheese, tea, coffee, (if ~~we~~ ~~use~~ ~~them~~ ~~at all~~) we are always exposed to the danger of adulteration, even if we buy the best qualities.

It seems to be impossible to do away altogether with the adulteration of food. With its preservation are connected too many facts, f. e. a wrong, perverted diet, the superficiality and ignorance of the public in general concerning the qualities of food and before all the excessive thirst of gain. —

In the following short articles we shall speak about the adulteration and deterioration of water, bread and milk.

The Water.

Although water ~~could~~ can not be called in the strictest sense of the word food, still we find it in almost ~~all substances~~ every kind of food, we use it to ~~their~~ its preparation and it is the cheapest and healthiest drink. Its quality exercises a great influence upon human health. Many Epidemic diseases, as Cholera, Typhus etc. are supported considerably in their development from impure drinking water. Good, pure drinking water must have the following qualities:

1, It must be clear, colourless, odourless and of refreshing taste. 2) it should contain in 1 Ltr. only a few solid substances, it should be therefore not hard. 3) it ~~all~~ should as much as possible be free of microscopical plants and animals and should not contain larger quantities of Calcium and Magnesium, at the most traces of Ammoniac and nitric acid.

We must consider drinking-water as impure and unwholesome, which contains:

1, distinctly and clearly Ammonia with nitric acid.

2, besides many organic substances also a good deal of chlorate, -

3, after it stands 2 or 3 days infusories, which can be seen under the microscope.

If muddy water, after it stands for sometime, becomes clear, then it contains suspended matters as clay, loam, mire etc., which are deposited its at the bottom. But if it remains muddy, we may be convinced of the existence of organic matter.

If we add to it some solution of potassium per=
manganate, it becomes clear again, because the
organic matter oxydates or burns. With this ~~the~~ disap=
pears the violet colour of the solution of potassium
permanganate. This may be ~~recognized considerate~~
considered this an excellent way to recognize organic
substances in the drinking-water. —

Yellowish coloured water usually contains
ferroso-ferric oxide. Water, which contains iron, tastes
like ink. Badsmelling or badtasting water contains
either putrifying vegetable or animal matter, also
sometimes gases, as sulphurated water from
neighboring sewers or also gas from a gas-plant.
Bitertasting water contains either magnesium sulphate
or sodium sulphate or sodium chloride.

If the water tasts soft or stale it is
wanting mostly carbon dioxide or carbonic acid.
These two substances communicate to the water
its refreshing taste. Through the process of boiling,

or if the water stands for sometime, these substances evaporate in the air. Therefore tasts boiled water so stale. We will mention here that the air, which the water contains, is used by the fishes as means of subsistence. —

All other substances, which remain ~~last~~ dissolved in water, after the same has evaporated and which form in cooking-utensils and kettles the so called kettle-stone, have their origin from the earth, which has been trickled through by the water. The more soluble substances the soil contains, the more they are dissolved by the water and exist in the same. Normal drinking-water should contain only 0,2 – 0,5% of these firm substances; a larger quantity is decidedly injurious to health. Water, which contains these ingredients of the soil in larger quantities, we call „hard", f.e. spring-water, on the other hand, if it contains no ingredients of the soil at all, we call „soft", f.e. rain-water. ———

Organic beings as Bacteria etc. may originate even in pure water, if the same has stood for sometime. Nitrohydrochloric acid and Ammonia are the products of putrefaction ~~from~~ of Nitrogen containing substances from water-closets, stables etc. Quite frequently therefore are wells or springs through neighboring cemeteries, slaughter-~~houses~~ and tanning houses by the above mentioned products of putrefaction infected and contaminated, but it depends a great deal upon the ~~stop~~. situation. Especially in larger cities, where the ground is soaked through with human and animal excretions the wells and pumps are not exempted. This evil however can be prevented to a great extent by sewers and good drainage. The conduit-pipes, mostly made from lead or iron, have a great deal to do with the deterioration of the water. —

Water is purified by filtration from the suspended substances; completely pure water can be obtained only by distillation. Instinct alone

is no protection against the injury of health by the use of contaminated drinking-water, because instinct discovers only coarse contaminations and infections. Drinking-water may be entirely clear and of quite agreeable taste and yet contain injurious substances.

The Bread (flour)

By flour we understand the grains of wheat, rye etc, which have been pulverized by the way of grinding. The adulteration of flour is confined mostly to the intermixture of better qualities with cheaper ones. Besides this commerce is carried on with flour, which has been mixed with sulphate of zinc, sulphate of copper, alum, plaster of Paris etc. Especially the fine, white qualities of flour used in confectioneries contain often plaster of Paris or chalk. The farmers sometimes pour over their flour a portion of sulphate of copper, in order to protect it from worms. To use better spoiled or moist and damp wheat-flour and to make the bread look better, the flour, especially in France and Belgium is mixed with a small quality of sulphate of copper and in England often with Alum. In preserving the leaven in copper vessels often verdigris is formed, which accomplishes the same

purpose as sulphate of copper. More frequently wheat- and rye flour is mixed with other kinds of flour, f.e. with flour of barley, oats, maize, potatoes, or flour ~~fr~~ of leguminous plants, as peas and beans. The examination and discernment of the different kinds of flour mixed with wheat- and ryeflour, is very difficult and uncertain, but on the other hand the proves of the existence of Zink, copper etc. very easy. The first one takes place by microscopical observations, because the small particles of the different ~~xpex~~ kind of flour differ from each other according to their seize and form. This method however proves only the adulteration, when there are found larger quantities of unusual kinds of flour. Most frequently wheat-flour is adulterated, because it is the most expensive kind of flour and is used mostly.

Good wheat-flour must possess the following general qualities:

1, it must look yellowish-white, not bluish- or reddish-white; 2, it must feel soft and yet

corny, must stick to the fingers and by the pressure of the hand easily be formed into a ball with a ~~grating~~ gritty noise. If it then forms a solid lump if it is too moist and damp, but if it separates from another, it proves the existence of too many mineral ingredients. 3, it must have a pleasant and refreshing odor, not sourish, not mouldy nor vaporish and not gritty between the teeth. All species of flour, which ~~grate~~ grind between the teeth, are adulterated with mineral ingredients. —

The manner of preparing bread is known to everybody. The flour is ~~formed~~ then formed by water into a dough, mixed with yeast or leaven and after kneading it thoroughly ~~for one hour~~ is left for some hours to warmth and quiet. —

The bakers, in order to gain ~~an~~ as large ~~as possible~~ profit as possible, must look well after it, that a certain quantity of flour produces ~~an~~ as large ~~as~~ and white as possible looking, well-tasting bread. In baking bread they

have therefore applied different chemical means, which produce carbonic acid and by puffing up the bread, enlarge its volumen. Among others we will mention here: leaven, yeast, double carbonate natron and salt of hart's-horn. These substances develop carbonic acid, which, when ~~they~~ evaporating puffs up the dough and makes the bread ~~[illegible]~~ spongy and porous.

As bread ~~forms~~ is the principal food for men, ~~therefore~~ its adulterations and deterioration therefore, or mistakes in its preparation are of a greater harmfulness and injiriousness than ~~with all~~ ~~t~~ it is the case with other means of subsistence.—

Milk.

Milk, as is known, is a solution of sugar, albumen, fat and different salts. Its opaqueness is caused by the fat, which it contains. —

The great supply of large Cities with milk is usually provided by so called dairies, which are located either inside or outside of the Cities. The cows live often in bad stables, they are wanting fresh air and exercise and are fed partly with distillery-slops and other similar wastes. In consequence of this mode treatment the animals become sick and suffer frequently of consumption. The milk of such consumpted animals if used by men, may be often the cause of consumption. In order to destroy completely in such milk the bacilla and their spores, a boiling of several hours is required. Scarlet may also be spread among men by the milk of diseased animals. Milk is not always composed of the same substances, according to their race, age and

means of subsistence of cows their substances may appear in different relations. It has no decided, ~~certain~~ weight and nor ~~entirely certain~~ fat-contents. Good milk should contain:

Water =	87,5 %	
Sugar =	4,8 %	
Albumen =	4,0 %	
Butterfat =	3,0 %	together:
Salts =	0,7 %	12,5 % dry substance 87,5 % water
	100,00	100,00

It should be white or yellowish-white, fatty and of somewhat thick liquidity. A bluish color is an almost sure sign, that the cream has been taken off.

This milk is mostly always a mixture of milk of different cows; its specific weight fluctuates between 1,029 and 1,034.

Most frequently milk is adulterated by putting to it water or by skimming it. If water is put to it, its specific weight sinks, which can be proved easily by the Areometer. Skimmed milk contains 0,3 - 0,5 % butter-fat. By separating the fat from the milk, its specific weight rises; such skimmed milk may be easily recognized by its bluish and thin-liquid appearance. Certain food as waste, turnips etc., also medicine may also under circumstances impart to the milk a peculiar taste or odor.

The so called half-milk is a mixture of skimmed Evening-milk and fresh morning-milk; it is sold frequently as good milk. During the summer we find, that frequently to the milk is added carbonate Natron or Borax, in order to prevent ~~the milk~~ it from getting sour.

Centrifugated or meager milk is milk produced by centrifugating (skaming) the butter-fat. It contains mostly all other substances of normal milk. In order to make watrish milk somewhat thicker, sometimes is added some starch, flour, sugar, albumen etc. But these ingredients can be discovered very easily.

	H_2O	Ash		CaO		Fe		Lime		Iron	
	%	%dry	Moist	dry	moist	dry	moist	(1)	(2)	(1)	(2)
	First analysis			2.55		.015					
1 Mt Spinach	85.6	23.0	3.3	2.04	.29	.0135	.0019	1.27	8.5	.008	3.9
2 Lamb's Quarter	85.3	23.3	3.4	2.95	.43	.0142	.0021	1.90	12.5	.009	4.3
				3.94		.036					
3 Red Root	81.9	17.6	3.2	4.08	.74	.0347	.0063	3.24	21.6	.028	12.9
				1.65		.0175					
4 Purslane	91.1	16.9	1.7	2.06	.20	.0196	.0019	.88	5.8	.008	3.9
5 Rainbow Chard	90.9	20.3	1.8	1.8	.16	.0227	.0021	.70	4.7	.009	4.3
6 New Zealand Spinach	92.3	23.9	1.8	1.48	.11	.0264	.0020	.48	3.2	.009	4.1
7 Quinoa	88.7	23.5	2.7	1.45	.16	.011	.0012	.79	4.7	.005	2.7
8 Turnip Tops	93.3	19.1	1.2	3.59	.24	.0343	.0023	1.05	7.0	.010	4.7
9 Narrow Leaved Dock	86.6	14.5	2.0	1.66	.23	.0478	.0065	1.00	6.7	.028	13.4

THE LIME CONTENT OF FOODSTUFFS

The following table shows in column (1) the amount of lime (grains) contained in one ounce. Column (2) shows the percent of one day's lime ration in one ounce. Column (3) shows the amount of the foodstuff required to supply 15.4 grains of lime (CaO) the amount required for one day. Column (4) shows the percent of one day's requirement of lime found in 100 calories. Column (5) shows the weight of one hundred calories (ounces). Column (6) is the weight of an ordinary serving. Column (7) gives the number of calories in an ordinary serving.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Almonds	1.464	9.5	10.5	5.2	.5	.5	100
Apples	.043	.3	358.0	1.6	5.3	5.3	[illegible]0
Apples, dried	.196	1.3	78.5	1.6	1.2	1.2	100
Apple juice	.049	.5	314.3	1.6	6.0	6.0	100
Apricots	.086	.6	180.0	3.3	6.1	3.0	50
Apricots, dry	.404	2.6	38.0	3.3	1.1		
Asparagus	.153	1.0	100.6	17.1	15.7	1.7	10
Bananas	.055	.4	280.0	1.2	3.5	3.5	100
Barley, entire	.263	1.7	58.5	3.0	1.7		
Barley, pearled	.122	.8	126.2	1.1	1.0	(3.5)	100
Beans, dried	.980	6.4	15.7	6.5	1.0	(3.2)	125
Beans, lima, dry	.435	2.8	35.4	2.8	1.0	(2.3)	100
Beans, Lima, Fresh	.171	1.1	90.0	2.8	2.9	3.0	100
Beans soya	2.000	13.0	7.7	11.2	.86	.86	100
Beans, string, fresh	.282	1.8	54.6	13.0	17.0	4.0	25
Beef, tenderloin	.057	.4	270.0	.45	1.29	2.5	200
Beets	.178	1.2	86.5	8.9	7.6	(2.2)	25
Blackberries	.104	.7	150.0	4.2	5.9	3.0	50
Blueberries	.122	.8	126.2	3.8	4.7	2.2	50
Blood	.049	.3					

Bran,Wheat	.735	4.8	21.0	5.7	1.2	.5	43
Bread,Boston Brown	.790	5.1	19.5	7.9	1.2	1.2	100
Bread, entire wheat	.133	.9	115.0	1.23	11.44	2.0	150
Bread, graham	.176	1.2	90.0	1.60	1.34	2.0	150
Bread, rye	.147	1.0	105.0	1.3	1.4	2.0	150
Bread, entire rye (pumpernickel)	.259	1.7	60.0	2.8	1.7	2.0	120
Bread, white	.091	.6	170.0	.8	1.3	2.0	150
Bread, fruit	.514	3.3	30.0				
Brussels Sprouts	.165	1.1	93.3	12.1	11.3	4.0	
Buckwheat flour	.239	1.6	64.4	5.9	1.0		
Butter	.092	.6	167.4	.3	.6	.5	113
Buttermilk	.643	4.2	24.0	41.1	10.0	6.1	75
Buttermilk Yogurt	.747	4.8	20.6	46.3	9.6	6.5	75
Cabbage	.276	1.8	56.0	20.0	11.1	4.0	25
Cabbage greens	.649	4.2	23.7	47.3	11.0	4.0	25
Cantaloupe	.104	.7	150.0	6.1	9.0	7.0	75
Carrots	.343	2.2	44.9	33.3	7.3	3.7	50
Cauliflower	.753	4.9	20.4	56.4	11.0	3.0	25
Celery	.478	3.1	32.2	58.9	18.0	1.0	6
Chard	.919	6.0	16.7	55.0	8.7	3.0	35
Cheese	5.702	37.0	2.7	29.7	.77	.5	70
Cheese, cottage	4.180	27.1	3.7	85.2	3.2	2.0	75
Cheese, Yogurt	4.285	27.8	3.6	26.0	.93	.5	50
Cherries	.116	.8	133.0	3.5	4.7	2.2	50
Cherry juice	.104	.7	150.0	3.1	4.6	4.6	100
Chestnuts	.208	1.3	75.0	1.9	1.4	1.5	100
Chicken, broiler	.066	.43	235.0	1.4	3.25	2.5	75
Coconut, dry	.361	2.3	42.6	.9	.6		
Coconut, fresh	.147	1.0	105.0	.9	.9	2.0	225
Corn, whole	.122	.8	126.2	.8	1.0	1.0	100

Cornmeal	.110	.7	140.0	.7	1.0	(4.5)	75
Corn, Sweet, fresh	.037	.2	416.0	.8	3.5	(2.7)	75
Corn, sweet, dry	.129	.8	114.4	.8	1.0		
Cow Peas	.612	4.0	25.1	4.1	1.0		
Cottonseed meal	1.623	10.5	9.5	9.2	.9		
Crackers	.135	.9	114.0	.8	.9	1.0	110
Cranberries	.110	.7	140.0	4.4	7.5	3.0	40
Cream	.527	3.42	29.2	7.2	1.75	2.2	125
Cucumbers	.098	.6	157.0	12.6	20.0	2.0	10
Currants, fresh	.159	1.0	96.8	6.3	6.1	3.0	50
Currants, dry, Zante	.502	3.3	30.7	3.6	1	1.5	140
Dandelion greens,	.643	4.2	24.0	24.1	5.5	3.0	
Dates	.398	2.6	38.6	2.6	1.0	1.0	100
Egg Plant	.067	.4	230.0	5.7	12.2	1.5	10
Eggs	.450	2.9	34.2	6.3	2.4	1.9	80
Egg, one(1.8 oz)	.810	5.2	19.0			1.08	80
Egg white	.092	.6	167.4	2.8	4.7	1.0	14
Egg white of one (1.2 oz)	.116	.7	140.0			1.2	17
Egg yolk one egg	.839	5.4	18.3	5.0	.9	1.0	100
Egg yolk (.6 oz.)	.503	3.3	30.6			.6	60
Endive	.637	4.1	24.0	45.5	11.0	(3.0)	25
Farina	.129	.8	119.4	.8	1.0		
Figs, dry	.992	6.4	15.6	7.2	1.1	2.0	188
Figs, fresh	.325	2.1	47.4	7.2	3.4	2.0	78
Fish	.134	8.7	114.6	2.6	3.0	6.0	200
Flour, buckwheat	.061	.5	252.5	1.5	1.0		
Flour, entire wheat	.190	1.2	81.0	1.2	1.0		
Flour, graham	.239	1.6	64.4	1.5	1.0		
Flour, white	.122	.8	136.2	.8	1.0		
Flour, rye	.110	.7	140.0	.7	1.0		
Flour, rye entire	.293	1.9	52.5	2.5	1.3		

Gluten Pure	1.025	6.6	15.0	6.6	1.0	.5	50
Gluten 40%	.400	2.6	38.0	2.6	1.0	1.0	100
Gluten 20% .	.200	1.3	76.0	1.3	1.0	1.0	100
G ooseberries	.214	1.4	72.0			2.5	
Grapefruit	.129	.8	119.4	5.6	6.7	3.5	50
Grapes	.115	.7	133.0	2.7	3.6	3.5.	100
Grapejuice	.067	.4	230.0	1.5	4.0	4.0	100
Guava	.086	.6	180.0				
Hazelnuts (filberts)	1.758	11.4	8.8	5.7	.5	.5	100
Hominy	.067	.4	230.0	.2	1.1	1.6	150
Honey	.024	.2	268.6	.2	1.1	1.6	150
Kohl-rabi	.472	.3	32.6	34.9	11.5	(10)	35
Lemon juice	.147	1.0	105.0	8.4	8.9	.5	5
Lentils, dry	.655	4.3	23.5	4.3	1.1	(3.0)	100
Lettuce	.263	1.7	58.5	31.4	18.4	1.0	5
Linseed meal	2.530	16.4	6.1				
Maple syrup	.655	4.3	23.5	5.3	1.3	1.2	100
Macaroni	.135	.9	114.0	.8	1.0	(3.0)	100
Mango	.129	.8					
Milk, whole	.735	4.8	21.0	24.3	5.1	6.0	125
Milk, skimmed	.747	4.8	20.6	46.3	9.6	6.5	75
Milk, condensed, sweetened	1.837	11.9	8.4	15.3	1.1	2.0	180
Milk, human	.208	1.4	70.0	7.0	4.75	5.0	100
Milk, camels	.876	5.7	17.5				
Milk, goats	.784	5.1	20.0				
Milk, sheeps	1.266	8.2	12.2				
Molasses	1.292	8.4	12.0	10.2	1.2	1.2	100
Mushrooms	.104	.7	150.0				
Millet	.086	.5	180.0				
Muskmelon	.104	.7	150.0	6.0	8.8	7.0	75

Mustard Greens	3.013	19.6	5.1			3.0	
Oatmeal	.423	2.7	36.4	2.4	.9	(4.2)	75
Okra	.435	2.8	35.4	2.4	9.3	(4.5)	50
Olives	.747	4.9	20.6	5.7	1.2	1.2	100
Onions	.208	1.3	75.0	9.7	7.2	(2.5)	35
Oranges	.276	1.8	55.7	12.3	6.8	5.0	75
Orange Juice	.178	1.2	86.5	9.3	8.0	6.0	75
Paprika	1.401	9.1	11.0				
Parsnips	.361	2.3	42.7	12.8	5.4	(3.0)	55
Peaches	.098	.6	157.1	5.3	8.1	4.1	50
Peaches, dry	.208	1.4	75.0	5.3	4.0	2.0	50
Pears	.092	.6	167.4	3.3	5.5	4.0	75
Pear juice	.055	.4	280.0	1.4	3.9	6.0	150
Peas, dry	.514	3.3	30.0	3.6	1.0	(3.0)	100
Peas, green	.171	1.1	90.0	4.0	3.5	3.5	100
Peanuts	.435	2.8	35.4	1.8	.6	.6	100
Pecan nuts	.545	3.5	28.2	1.7	.5	.5	100
Persimmons	.135	.9	114.0				
Pineapple	.110	.7	140.0	5.8	8.1	4.0	50
Plums	.122	.8	126.2	3.3	4.1	4.1	100
Potatoes	.086	.5	180.0	2.5	4.2	(3.0)	75
Potatoes, sweet	.116	.7	133.0	2.3	2.8	(3.5)	200
Prunes, dried	.331	2.2	46.5	2.5	1.2	(3.7)	100
Pumpkin	.141	.9	109.2	12.5	13.6	(3.5)	25
Radishes	.129	.8	119.4	10.2	11.9	1.0	6
Raisins	.392	2.5	39.3	2.8	1.0	1.0	100
Raspberries	.300	2.0	52.3	10.4	5.3	4.1	75
Raspberry juice	.129	.8	119.4	3.0	3.4	5.0	150
Rice, polished	.055	.3	280.0	.3	1.0	(4.0)	125
Rice, brown	.073	.5	211.0			3.0	

Romaine	.276	1.8	57.0				
Rutabagas	.453	2.9	34.0	25.9	8.8	(4.0)	25
Rye, entire	.337	2.2	45.7	3.0	1.3		
Spinach	.410	2.7	33.6	39.3	15.0	(3.0)	20
Squash	.116	.7	133.0	5.5	7.6	(3.7)	50
Strawberries	.251	1.6	61.3	14.6	9.4	4.7	50
Tapioca	.141	.9	109.2	.6	1.0	1.0	100
Tomatoes	.067	.4	230.0	7.0	15.3	4.0	25
Tomato juice	.037	.2	416.0				
Turnips	.392	2.5	39.3	22.6	9.0	(4.5)	50
Turnip tops	2.125	13.8	7.2			3.0	
Walnuts	.545	3.5	28.3	1.8	[illegible]	.5	100
Watercress	1.153	7.5	13.4	135.0	18.0	1.5	10
Watermelon	.067	.4	230.0	5.3	11.6	8.0	75
Wheat, entire	.276	1.8	56.0	1.8	1.0	(5.7)	150
Wheat, bran	.735	4.8	21.0	5.7	1.2	.5	43
Wheat, germ	.435	2.8	35.4	2.8	1.0	1.0	100
Whey	.269	1.9	57.2	22.7	13.0	7.0	50

Lime- TABLE I addendum

THE LIME CONTENT OF HEALTH FOODS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Protose	.416	2.7	37.0	5.4	2.0	2.0	100
Nuttolene	.263	1.7	58.5	3.5	2.0	2.0	100
Gluten, pure	.498	3.1	32.2	3.1	1.0	.5	50
Gluten, 40%	.191	1.2	80.0	1.2	1.0	1.0	100
Gluten, 20%	.095	.6	160.0	.6	1.0	1.0	100
Meltose (Malt Honey)	.122	.8	126.2	1.5	1.2	2.4	200
Savora	1.207						
Brose (oatmeal and bran)	.485	3.1	32.0	3.0	1.0	1.0	100
Malt sugar	.262	1.7	60.0	1.7	1.0	2.0	200
Malted Nuts	.433	2.3	35.5	1.9	.7	1.3	200
Nut Soup Stock	.171						

Lime - TABLE 1 a

FOODS RICH IN LIME SALTS

The following table of foods which are richest in lime salts shows in column (1) the amount of lime (CaO) in one ounce. (2) the percentage of the lime ration (15.4) grains) found in one ounce. (3) the amount required to supply the lime ration, 1 gram (15.4 grains) for one day. (4) The percentage of the lime ratio found in 100 calories. (5) Weight of 100 calories (ounces). (6) Weight of an ordinary serving (ounces). (7) The number of calories in an ordinary serving.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Almonds	1.464	9.5	10.5	5.2	.5	.5	100
Beans, dry	.980	6.4	15.7	6.5	100	(3.2)	125
Beans, soya	2.000	13.0	7.7	11.2	.86	1.7	200
Bread, Boston brown	.790	5.1	19.5	7.9	1.2	1.2	100
Brose	.485	3.1	32.0	3.0	1.0	1.0	100
Buttermilk	.645	4.2	24.0	41.1	10.0	6.0	60
Cabbage greens	.649	1.0	23.7	47.3	11.0	4.0	25
Cauliflower	.753	4.0	20.4	56.4	11.0	3.0	25
Celery	.478	3.0	32.2	58.9	18.0	1.0	6
Chard	.919	6.0	16.7	55.0	8.7	3.0	35
Cheese	5.702	37.0	2.7	29.7	.77	.5	70
Cheese, cottage	4.180	27.1	3.7	85.2	3.2	2.0	75
Cheese, yogurt	4.285	27.8	3.0	26.0	.93	.5	50
Cow peas	.612	4.0	25.1	4.1	1.0		
Cottonseed meal	1.623	10.5	9.5	9.2	.9		
Currants, dry, Zante	.502	3.3	30.7	3.6	1.1	1.5	140
Dandelion greens	.643	4.2	24.0	24.1	5.5	3.0	60
Dates	.400	2.6	38.6	2.6	1.0	1.0	100
Eggs	.450	2.9	3.2	6.3	2.4	1.3	70
Egg Yolk	.839	5.4	18.3	5.0	.9	1.0	110
Endive	.637	4.1	24.0	45.5	11.0	3.0	25
Figs, dry	.992	6.4	15.5	7.2	1.1	2.0	100
Gluten pure	1 .025	6.6	15.0	6.6	1.0	.5	50
Gluten 40%	.400	2.6	38.0	2.6	1.0	1.0	100

Hazelnuts (filberts)	1.758	11.4	8.8	5.7	.5	.5	100
Kohl-rabi	.472	3.0	32.6	34.9	11.5	4.0	35
Lentils, dry	.655	4.3	23.5	4.3	1.1	(3.0)	100
Linseed meal	2.530	16.4	6.1				
Maple syrup	.655	4.3	23.5	5.3	1.3	1.3	100
Milk, skimmed	.[illegible]47	4.8	20.6	46.3	9.6	6.5	75
Milk. whole	.735	4.8	21.0	34.3	5.1	6.0	125
Milk, condensed, sweetened	1.837	11.9	8.4	15.3	1.1	2.0	100
Molasses	1.292	8.4	12.0	10.2	1.2	1.2	100
Mustard greens	3.013	19.6	5.1			3.0	
Oatmeal	.423	3.7	36.4	2.4	.9	(4.2)	75
Okra	.435	2.8	35.4	2.4	9.3	4.5	50
Olives	.747	4.9	20.6	5.7	1.2	1.2	100
Paprika	1.401	9.1	11.0			1.0	
Peas, dry	.514	3.3	30.0	3.6	1.0	3.0	100
Peanuts	.435	2.8	35.4	1.8	.6	.6	100
Pecan nuts	.545	3.5	28.2	1.7	.5	.5	100
Protose	.416	2.7	37.0	5.4	2.0	2.0	100
Raisins	.392	2.5	39.3	2.8	1.0	1.0	100
Rutabagas	.435		34.0	25.9	8.8	(4.0)	25
Spinach	.410	2.7	33.6	39.3	15.0	(3.0)	20
Turnips	.392	2.5	39.3	22.6	9.0	(4.5)	50
Turnip tops	2.125	13.8	7.2			3.0	
Walnuts	.545	3.5	28.3	1.8	.5	.5	100
Watercress	1.153	7.5	13.4	135.0	18.0	1.5	10
Wheat, bran	.735	4.7	21.0				
Wheat, germ	.435	2.8	35.4	2.8	1.0	1.0	100
Whey	.269	1.0	57.2	22.7	13.0	7.0	50

Lime - Table II

THE LIME CONTENT OF FRUITS

The following table shows the lime content of uncooked fruits. Column (1) gives the amount of lime found in one ounce. Column (2) shows the percentage of the lime ration (15.4 grains) found in one ounce. Column (4) shows the percentage of the lime ration found in 100 calories. Column (7) gives the number of calories in an ordinary serving. (See Battle Creek Sanitarium Diet List.)

	(1)	(2)	(4)	(7)
Apples	.043	.3	1.6	100
Apples, dried	.196	1.3	1.6	100
Apple juice	.049	.5	1.6	100
Apricots	.086	.6	3.3	50
Apricots, dry	.404	2.6	3.3	
Bananas	.055	.4	1.2	100
Blackberries	.104	.7	4.2	50
Blueberries	.122	.8	3.8	50
Breadfruit	.514	3.3		
Cantaloupe	.104	.7	6.1	75
Cherries	.116	.8	3.5	50
Cherry juice	.104	.7	3.1	100
Cranberries	.110	.7	5.4	40
Currants, fresh	.159	1.0	6.3	50
Currants, dry, Zante	.502	3.3	3.6	140
Dates	.398	2.6	2.6	100
Figs, dry	.992	6.7	7.2	180
Figs, fresh	.325	2.1	7.2	70
Gooseberries	.214	1.4		
Grapefruit	.129	.8	5.6	50
Grapes	.115	.7	2.7	100
Grape juice	.067	.4	1.5	100
Guava	.086	.6		
Lemon juice	.147	1.0	8.4	5

	(1)	(2)	(4)	(7)
Mango	.129	.8		
Muskmelon	.104	.7	6.0	75
Olives	.747	4.9	5.7	100
Oranges	.276	1.8	12.0	75
Orange juice	.178	1.2	9.3	75
Peaches	.098	.6	5.3	50
Peaches, dry	.208	1.4	5.3	50
Pears	.092	.6	3.3	75
Pear juice	.055	.4	1.4	150
Persimmons	.135	.9		
Pineapple	.110	.7	5.8	50
Plums	.122	.8	3.3	100
Prunes, dry	.331	2.2	2.5	100
Raisins	.392	2.5	228	100
Raspberries	.300	2.0	10.4	75
Raspberry juice	.129	.8	3.0	150
Strawberries	.251	1.6	14.6	50
Tomatoes	.067	.4	7.0	25
Tomato juice	.037	.2		
Watermelon	.067	.4	5.3	75

Lime - TABLE 11a

FRUITS WHICH HAVE THE LARGEST LIME CONTENT

	(1)	(2)	(4)	(7)
Currants, dry Zante	.502	3.3	3.6	140
Dates	.400	2.6	2.6	100
Figs, dry	1.000	6.4	7.2	180
Olives	.750	4.9	5.7	100
Oranges	.276	1.8	12.0	75
Prunes	.231	2.2	2.5	100
Raisins	.392	2.5	2.8	100
Raspberries	.300	2.0	10.4	75
Strawberries	.250	1.6	14.6	50

Lime - Table 111

THE LIME CONTENT OF NUTS

The following table shows the lime content of nuts. Column (1) gives the amount of lime found in one ounce. Column (2) shows the percentage of the lime ration (15.4 grains) found in one ounce. Column (4) shows the percentage of the lime ration found in 100 calories. Column (7) gives the number of calories in an ordinary serving.

	(1)	(2)	(4)	(7)
Almonds	1.464	9.5	5.2	100
Chestnuts	.208	1.3	1.9	100
Cocoanut, dried	.361	2.3	.9	
Hazelnuts (filberts)	1.758	11.4	5.7	100
Peanuts	.435	2.4	1.8	100
Pecan nuts	.545	3.5	1.7	100
Walnuts	.545	3.5	1.8	100

Lime- TABLE IV.

THE LIME CONTENT OF CEREALS AND BREADS

The following table shows in column (1) the amount of lime found in one ounce. Column (2) gives the percentage of the lime ration (15.4 grains) in one ounce. Column (4) gives the percentage of the lime ration found in 100 calories. Column (7) shows the number of calories in an ordinary serving. (See Battle Creek Sanitarium Diet List)

	(1)	(2)	(4)	(7)
Barley, entire	.262	1.7	3.0	
Barley, pearled	.122	.8	1.1	100
Bread, Boston Brown	.790	5.1	7.9	100
Bread, entire wheat	.133	.9	1.23	150
Bread, graham	.176	1.2	1.6	150
Bread, rye	.147	1.0	1.3	150
Bread, entire rye (pumpernickel)	.259	1.7	2.8	120
Bread, white	.091	.6	.8	150
Buckwheat flour	.239	1.6	5.9	
Corn, whole	.122	.8	.8	100
Cornmeal	.110	.7	.7	75
Cottonseed meal	1.623	10.5	9.2	
Crackers	.135	.9	.8	110
Farina	.129	.8	.8	
Flour, buckwheat	.061	.4	1.5	
Flour, entire wheat,	.190	1.2	1.2	
Flour, graham	.239	1.6	1.5	
Flour, white	.123	.8	.8	
Flour, rye	.110	.7	.7	
Flour, rye entire	.293	1.9	2.5	
Hominy	.067	.4	.2	100
Linseed meal	2.530	16.4		
Macaroni	.135	.9	.8	100
Millet	.086	.5		
Oatmeal	.423	2.7	2.4	75

Rice, polished	.055	.3	.3	125
Rice, brown	.073	.5	.4	100
Rye, entire	.337	2.2	3.0	
Tapioca	.141	.9	.6	100
Wheat, entire	.276	1.8	1.8	
Wheat, bran	.735	4.7		
Wheat, germ	.435	2.8	2.8	100

Lime - TABLE V.

THE LIME CONTENT OF VEGETABLES

The following table shows in column (1) the amount of lime found in one ounce. Column (2) shows the percentage of the lime ration (15.4 grains) found in one ounce. Column (4) gives the percentage of the lime ration found in 100 dalories Column (7) shows the number of calories in an ordinary serving. (See Battle Creek Sanitarium Diet List).

	(1)	(2)	(4)	(7)
Asparagus				
Beans, lima, fresh	.171	1.1	2.8	100
Beans, string, fresh	.282	1.8	13.0	25
Beets	.178	1.2	8.9	25
Brussels sprouts	.165	1.1	12.1	
Cabbage	.276	1.8	20.0	25
Carrots	.343	2.2	33.3	50
Cauliflower	.753	4.0	56.4	25
Corn, sweet, fresh	.037	.2	.8	75
Cucumbers	.098	.6	12.6	10
Eggplant	.067	.4	5.7	10
Kohl-rabi	.472	3.0	34.9	35
Mushrooms	.104			
Okra	.435	2.8	2.4	50
Onions	.208	1.3	9.7	35
Parsnips	.361	2.3	12.8	55
Potatoes	.036	.5	2.5	75
Potatoes, sweet	.116	.7	2.3	200
Pumpkin	.141	.9	12.5	25
Radishes	.129	.8	12.2	6
Rutabagas	.453	2.9	25.9	25
Squash	.116	.7	5.5	50
Turnips	.392	2.5	22.6	50

Lime - TABLE VI

THE LIME CONTENT OF LEGUMES

The following table shows in column (1) the amount of lime found in one ounce. Column (2) gives the percentage of the lime ration (15.4 grains) found in one ounce. Column (4) shows the percentage of the lime ration in 100 calories. Column (7) gives the number of calories in an ordinary serving. (See Battle Creek Sanitarium List).

	(1)	(2)	(4)	(7)
Beans, dry	.980	6.4	6.5	125
Beans, lima dry	.435	2.8	2.8	100
Beans, Soya				
Cow peas	.612	4.0	4.1	
Cottonseed meal	1.623	10.5	9.2	
Lentils, dry	.655	4.3	4.3	100
Linseed Meal	2.530	16.4		
Peas, dry	.612	3.3	3.6	100
Peas, green	.171	1.1	4.0	100

Lime - TABLE VII

THE LIME CONTENT OF GREENS

The following table shows in column (1) the amount of lime found in one ounce. Column (2) gives the percentage of the lime ration found in one ounce. Column (4) gives the percentage of the lime ration found in 100 calories. Column (7) shows the number of calories in an ordinary serving. (See Battle Creek Sanitarium Diet List).

	(1)	(2)	(4)	(7)
Asparagus	.153	1.0	17.1	10
Celery	.478	3.1	58.9	6
Chard	.919	6.0	55.0	35
Dandelion greens	.643	4.2	24.1	
Endive	.367	4.1	45.5	25
Lettuce	.263	1.7	31.4	5
Mustard greens	3.013	19.6		
Paprika	1.401	9.1		
Romaine	.276	1.8		
Spinach	.410	2.7	39.3	20
Turnip tops	2.125	13.8		
Watercress	1.153	7.5	135.0	10

Lime - TABLE VIII

THE LIME CONTENT OF ANIMAL FOODS

The following table shows in column (1) the amount of lime found in one ounce. Column (2) gives the percentage of the lime ration (15.4 grains) in one ounce. Column (4) shows the percentage of the lime ration found in 100 calories. Column (7) gives the number of calories in an ordinary serving. (See Battle Creek Sanitarium Diet List.)

	(1)	(2)	(4)	(7)
Dairy Products				
Milk, whole	.735	4.8	24.3	125
Milk, skimmed	.747	4.8	46.3	75
Milk, condensed, sweetened	1.837	11.9	15.3	180
Buttermilk	.643	4.2	41.1	75
Cheese	5.702	37.0	29.7	70
Cheese, cottage	4.180	27.1	21.2	75
Cheese, yogurt	4.285	27.8	26.0	50
Cream	.527	3.42	7.2	125
Butter	.092	.6	.3	113
Whey	.269	1.0	22.7	50
Milk, human	.208	1.4	7.0	100
Eggs				
Eggs	.450	2.9	6.3	60
Eggyolk	.839	5.4	5.0	110
Egg white	.092	.6	2.8	20
Meats				
Beef, tenderloin	.057	.4	.45	200
Chicken, broilers	.066	.43	1.4	75
Fish	.134	8.7	2.6	200
Blood	.049	.32		

Lime and Iron TABLE IX

FOODS RICH IN IRON AND LIME

The following table shows the amount of lime and iron per ounce (1). The percentage of the day's ration of iron and of lime in one ounce (2). The percentage of the iron ration and the lime ration in 100 calories (4). The number of calories in an ordinary serving. (7)

	(1)		(2)		(4)		(7)
	Iron	Lime	Iron	Lime	Iron	Lime	
Almonds	.0172	1.464	7.3	9.5	4.0	5.2	100
Beans, dry	.0306	.980	13.8	6.4	13.5	6.5	125
Beans, soya	.0248	2.000	10.7	13.0	9.2	11.2	100
Bread, Boston Brown	.0131	.790	5.6	5.1	9.0	7.9	100
Cabbage greens	.0079	.649	3.4	4.2	30.0	47.3	25
Chard	.0100	.919	4.7	6.0	44.0	55.0	35
Currants, dry zante	.0109	.502	4.7	3.3	6.0	3.6	140
Dandelion greens	.0118	.643	5.1	4.2	30.0	24.1	50
Dates	.0131	.398	5.7	2.6	6.0	2.6	100
Eggs	.0131	.450	5.7	2.9	14.0	6.3	70
Eggyolk	.0377	.839	16.3	5.4	15.3	5.0	110
Endive	(.0106)	.637	4.6	4.1	50.5	45.5	25
Figs, dry	.0131	.992	5.7	6.4	6.3	7.2	180
Hazelnut	.0179	1.758	7.75	11.4	4.0	5.7	100
Lentils, dry	.0277	.655	16.3	4.3	19.5	4.3	100
Mustard greens	(.0213)	3.013	9.2	19.6			
Oatmeal	.0166	.423	7.2	2.7	6.4	2.4	75
Olives	.0127	.747	6.5	4.9	6.5	5.7	100
Peas, dry	.0249	.514	10.8	3.3	11.0	3.6	100
Pecan nuts	.0114	.545	4.9	3.5	2.3	1.7	100
Raisins	.0092	.392	4.0	2.5	9.2	2.6	100
Spinach	.0158	.410	6.8	2.7	100.4	38.3	20
Turnip tops	.0152	2.125	6.6	13.3			
Walnuts	.0092	.545	4.0	3.5	2.0	2.0	100
Wheat bran	.0341	.735	14.8	4.7			

TABLE I.

THE IRON CONTENT OF FOODSTUFFS

The following table shows in column (1) the amount of food iron calculated as grains of metallic iron in one ounce of foodstuff. (2) The percent of one day's iron ration (.213 grains) in one ounce. (3) The amount (ounces) of foodstuff required for one day's iron ration. (4) The percent of the iron ration found in 100 calories. (5) The weight in ounces of 100 calories. (6) The weight in ounces of an ordinary serving. (7) The number of calories in an ordinary serving.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Almonds	.0171	7.235	13.6	4.0	.5	.5	10
Apples	.0013	.56	177.7	3.2	5.6	5.0	100
Apples, dried	.0065	2.80	35.5	3.2	1.2	1.2	100
Apple Juice	.0009	.39	256.6	3.0	6.0	6.0	100
Apricots	.0013	.56	177.7	3.5	6.1	3.0	50
Apricots, dried	.0061	2.64	38.0	3.5	1.1	.6	50
Asparagus	.0044	1.90	52.5	30.0	15.7	1.6	10
Bananas	.0026	1.12	90.0	4.0	3.5	3.5	100
Barley, entire	.0179	7.75	13.0	7.6	1.7		
Barley, pearled	.0088	3.80	26.2	3.8	1.0	3.5	100
Beans, dry	.0306	13.25	7.5	13.5	1.0	3.2	125
Beans, lima, dry	.0306	13.25	7.5	13.3	1.0	2.25	25
Beans, lima, fresh	.0088	3.80	26.0	10.7	2.9	4.0	25
Beans, soya	.0248	10.73	9.3	9.2	.86	.86	100
Beans, string, fresh	.0048	2.08	48.0	17.7	17.0	4.0	25
Beef, all lean	.0170	7.36	13.6	30.0	4.0	4.0	100
Beefsteak, med. fat	.0097	4.20	24.0	10.48	2.5	4.0	160
Beets	.0026	1.12	90.0	9.0	7.6	2.2.	25
Blackberries	.0026	1.12	90.0	7.0	5.9	3.0	50
Bread, Boston Brown	.0131	5.6	17.5	9.0	1.2	1.2	100
Blood	.2301	100.0	1.0				
Blueberries	.0039	1.7	58.0	8.0	4.7	2.5	50
Bread, entire wheat	.0070	3.03	33.0	4.3	1.4	2.0	150
Bread, Graham	.0109	4.70	21.0	6.4	1.3	2.0	150

							b
Bread, rye	.0070	3.03	33.0	2.6	1.4	2.0	150
Bread, entire rye (pumpernickel)	.0088	3.81	26.2	6.5	1.7	2.0	120
Bread, white	.0039	1.70	58.0	2.3	1.3	2.0	150
Bread, fruit							
Brose	.0200	8.6	11.5	8.6	1.0	1.0	100
Brussels sprouts	.0048	2.08	48.0	23.4	11.3	.3	25
Buckwheat flour	.0053	2.30	43.6	2.3	1.0	1.0	100
Butter	.0009	.40	2256.6	.2	.46	.5	100
Buttermilk	.0011	.50	210.0	4.7	10.0	6.0	60
Cabbage	.0048	2.08	48.0	23.4	11.0	4.0	25
Cabbage greens	.0079	3.40	29.0	30.0	11.0	4.0	25
Cantaloupe	.0013	.56	178.0	4.7	9.0	7.0	75
Carrots	.0026	1.12	90.0	9.0	7.3	3.7	50
Cauliflower	.0026	1.12	90.0	13.0	11.0	3.0	25
Celery	.0022	.95	105.0	18.0	18.0	1.0	5
Chard	.0100	4.70	21.0	44.0	8.7	3.0	35
Cheese	.0057	2.42	40.5	2.0	.77	.5	65
Cheese, cottage	.0042	1.82	55.0	5.8	3.2	2.0	60
Cheese, yogurt	.0043	1.84	51.0	1.7	.93	.5	50
Cherries	.0018	.78	128.0	3.4	4.7	2.55	50
Cherry juice	.0013	.56	177.7	2.5	4.6	5.0	100
Chestnuts	.0031	1.30	77.0	2.0	1.4	1.8	100
Chicken	See beef.						
Cocoanut, fresh	.0051	2.21	45.5	2.0	.9	1.0	110
Corn, whole	.0127	5.50	18.0	5.0	1.0		
Cornmeal	.0039	1.70	58.0	2.0	1.0	4.5	75
Corn, sweet, fresh	.0035	1.50	66.0	4.8	3.5	2.7	75
Corn, sweet, dried	.0127	5.50	118.0	5.5	1.0	1.0	100
Cow peas							

							c
Cottenseed meal							
Crackers	.0066	3.0	35.0	2.4	.9	1.0	110
Cranberries	.0026	1.12	90.0	9.0	7.5	33.0	40
Cream	.0010	.43	231.0	.7	1.8	2.2	125
Cucumbers	.0009	.40	255.6	8.0	20.0	2.0	10
Currants, fresh	.0022	.94	110.0	6.0	6.0	3.0	50
Currants, dried, zante	.0109	4.72	21.0	6.0	1.1	1.5	135
Dandelion greens	.0118	5.11	19.4	30.0	5.5	3.0	50
Dates	.0131	5.67	17.5	6.0	1.0	1.0	100
Eggplant	.0022	.95	110.0	12.3	12.3	1.5	10
Eggs	.0131	5.67	17.5	13.6	2.4	1.8	75
Egg, one(1.8 oz.)	.0244	10.54				1.8	75
Eggwhite	.0004	.17	580.0	1.3	4.7	1.0	12.5
Eggwhite of one egg (1.2 oz)	.0005	.20				1.2	15
Eggyolk	.0376	16.32	6.0	15.3	.94	1.0	100
Eggyolk of one egg (.6 oz)	.0226	9.8				.6	60
Endive	.0106	4.6	20.0	50.5	11.0	33.0	25
Farina	.0035	1.51	65.6	1.5	1.0	1.0	100
Figs, dried	.0131	5.67	17.5	6.3	1.1	2.0	180
Figs, fresh	.0044	1.47	52.5	6.3	3.4	2.0	60
Fish (haddock)	.0029	1.3	80.0	6.3	3.0	6.0	200
Flour, buckwheat	.0053	2.30	45.6	2.3	1.0		
Flour, entire wheat	.0110	4.72	21.0	4.7	1.0		
Flour, graham	.0162	7.0	15.5	7.0	1.0		
Flour, white	.0044	1.90	52.5	1.5	1.0		
Flour, rye	.0057	2.47	40.5	2.5	1.0		
Flour, rye entire	.0146	6.54	16.0	6.8	1.0		
Gooseberries	.0022	.95	105.0	6.0	6.0	2.5	40
Grapefruit	.0013	.56	177.0	4.0	6.7	3.5	50

							d
Grapes	.0013	.56	177.0	2.0	3.6	3.6	100
Grapejuice	.0013	.56	177.0	2.0	4.0	4.0	100
Guava							
Hazelnuts	.0179	7.75	13.0	4.0	.5	.5	100
Hominy	.0040	1.69	58.0	1.7	1.0	1.0	100
Honey	.0031	1.34	77.0	2.0	1.1	1.6	150
Huckleberries	.0039	1.69	58.0	8.0	5.0	2.5	50
Kehl-rabi	.0026	1.12	90.0	9.0	8.0	4.0	35
Lemon juice	.0026	1.12	90.00	9.0	8.0		
Lentils, dried	.0377	16.32	6.1	19.5	1.1	3.0	100
Lettuce	.0031	1.34	74.5	52.3	18.4	1.0	5
Linseed meal							
Maple Syrup	.0121	.57	17.5	7.0	1133	1.3	100
Malted Nuts	.0192	8.3	12.0	5.5	.7	1.3	200
Macaroni	.0053	.51	42.6	2.2	1.0	3.0	100
Meat (tenderloin)	0131	6.00	17.6	7.0	1.2	2.4	200
Mango							
Milk, whole	.0011	.47	210.0	2.3	5.1	6.0	120
Milk, buttermilk	.0011	.50	210.0	4.7	10.0	6.0	75
Milk, skimmed	.0011	.47	210.0	4.5	9.6	6.5	65
Milk, Condensed sweetened	.0026	1.12	90.0	1.3	1.1	2.0	180
Milk, human	.0023		100.0	5.0		5.0	100
Milk, camels							
Milk, goats							
Milk, sheep							
Molasses	.0320	1.38	7.3	17.0	1.2	1.2	100
Millet							
Mushroons							
Muskmelon	.0013	.56	175.0	5.3	8.8	7.0	75
Mustard greens	.0213	9.22	10.0			3.0	
Oatmeal	.0166	7.19	14.0	6.4	.9	4.2	75
Okra							
Olives	.0127	5.49	18.0	6.5	1.2	1.2	100

Onions	.0026	1.12	90.0	7.0	7.2	2.5	35
Oranges	.0009	1.69	256.6	2.6	6.8	5.0	75
Orange juice	.0009	1.69	256.6	3.0	8.0	6.0	75
Paprika							
Parsnips	.0026	1.12	90.0	6.0	5.4	3.0	55
Peaches	.0013	.56	180.0	5.0	8.0	4.0	50
Peaches, dried	.0052	2.29	45.0	5.0	4.0	2.0	50
Pears	.0013	.56	180.0	3.1	5.5	4.0	75
Pear juice							
Peas, dry	.0249	10.78	9.2	11.0	1.0	3.0	100
Peas, green	.0074	3.16	31.0	11.3	3.5	3.5	100
peanuts	.0088	3.81	26.2	2.4	.6	.6	100
Pecan nuts	.0114	4.93	20.3	2.3	.5	.5	100
Persimmons							
Pineapple	.0022	.95	105.0	3.0	8.1	4.0	50
Plums	.0022	.95	105.0	4.0	4.1	4.0	100
Potatoes	.0057	2.47	40.5	10.4	4.2	3.0	75
Potatoes, sweet	.0022	.95	105.0	2.6	2.8	3.5	100
Protose	.0249	10.8	9.2	21.5	2.0	2.0	100
Prunes, dried	.0131	5.67	17.5	7.0	1.2	3.7	100
Pumpkin	.0035	1.51	66.0	8.7	13.6	3.5	25
Radishes	.0026	1.12	90.0	13.7	11.9	1.0	6
Raisins	.0092	4.00	25.0	9.2	1.0	1.0	100
Raspberries	.0026	1.12	90.0	6.0	5.3	4.0	75
Raspberry juice							
Rice, polished	.0039	1.68	58.0	1.7	1.0	4.0	125
Rice, brown	.0088	3.81	26.0	4.0	1.0	1.0	100
Romaine	.0525	22.73	64.0			3.0	
Rutabagas							
Rye flour	.0057	2.47	40.5	2.5	1.0	1.0	100
Rye, entire	.0171	7.40	13.4	9.6	1.3	1.3	100
Spinach	.0158	6.84	14.6	100.4	15.0	3.0	20

							f
Squash	.0026	1.12	80.0	.9	7.6	3.7	50
Strawberries	.0035	1.51	66.0	13.7	9.4	4.0	45
Tapioca	.0070	3.03	33.0	3.0	1.0	1.0	100
Tomatoes	.0018	.73	128.0	11.7	13.3	4.0	25
Tomato juice							
Turnips	.0022	.95	105.0	8.5	9.0	4.5	50
Turnip tops	.0152	6.58	14.0			3.0	
Walnuts	.0092	4.00	25.0	2.0	.5	.5	100
Watercress	.0083	3.60	28.0			1.5	10
Watermelon	.0013	.56	177.7	6.6	11.6	8.0	75
Wheat, entire	.0219	9.50	10.55	9.0	1.0	5.7	150
Wheat bran	.0341	14.76	6.7	17.7	1.2	.5	43
		Av. 3.25		Av. 6.38			

Iron - Table I--addendum

THE IRON CONTENT OF HEALTH FOODS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Protose	.0249	10.8	9.2	21.5	210	2.0	100
Nuttolene	.0171	7.4	13.5	14.8	2.0	2.0	100
Gluten, pure	.1487	64.3	1.5	64.3	1.0	.5	50
Gluten, 40%	.0600	26.0	3.85	26.0	1.0	1.0	100
Gluten, 20%	.0300	13.0	7.7	13.0	1.0	1.0	100
Savora	.6260						
Brose	.0200	8.6	11.5	8.6	1.0	1.0	100
Malt Sugar	.0214	9.3	10.8	9.3	1.0	2.0	200
Malted Nuts	.0192	8.3	12.0	5.5	.7	1.3	200
Nut Soup Stock	.0276						

Iron--Table Ia

Foods Rich In Iron

The following table shows in column (1) the amount of food iron calculated as grains of metallic iron in one ounce of foodstuff. (2) The percent of one day's iron ration(.213 grains) in onecounce. (4) The percent of the iron ration found in 100 calories. (7) The number of calories in an ordinary serving.

	(1)	(2)	(4)	(7)
Almonds	.0171	7.35	4.0	100
Barley, entire	.0179	7.75	7.6	100
Barley, pearled	.0088	3.80	3.8	100
Beans, dry	.0306	13.25	13.5	125
Beans, soya	.0248	10.73	9.2	100
Beans, lima, dry	.0306	13.24	13.3	25
Beans, lima, fresh	.0088	3.80	10.7	25
Beef, all lean	.0170	7.36	30.0	100
Beefsteak (Med. fat)	.0097	4.20	10.5	160
Bread, Boston Brown	.0131	5.6	9.0	100
Bread, graham	.0109	4.70	6.4	150
Bread, entire wheat	.0070	3.03	4.3	150
Bread, entire rye (pumpernickel)	.0088	3.81	6.5	120
Cabbage greens	.0079	3.40	30.0	25
Chard	.0100	4.70	44.0	35
Corn, whole	.0127	5.50	5.0	
Corn, sweet, dried	.0127	5.50	5.5	100
Currants, dry, Zante	.0109	4.72	6.0	140
Dandelion greens	.0118	5.11	30.0	50
Dates	.0131	5.67	6.0	100
Eggs	.0131	5.67	14.0	70
Egg yolk	.0377	16.32	15.3	110
Endive	.0106	4.6	50.5	25
Figs, dry	.0131	5.67	6.3	180
Flour, entire wheat	.0110	4.72	4.7	

Flour, graham	.0162	7.00	7.0	
Flour, rye entire	.0146	6.34	6.5	
Hazelnuts (filberts)	.0179	7.75	4.0	100
Lentils, dry	.0377	16.32	19.5	100
Molasses	.0320	1.38	17.0	100
Mustard greens	.0213	9.22		
Oatmeal	.0166	7.19	6.44	75
Olives	.0127	6.49	6.5	100
Peas, dry	.0249	10.78	11.0	100
Pecan nuts	.0114	4.93	2.3	100
Prunes, dry	.0131	5.67	7.0	100
Raisins	.0092	4.00	9.2	100
Rice, brown	.0088	3.81	4.0	100
Romaine	.0525	22.73		
Rye, entire	.0171	7.40	9.6	100
Spinach	.0158	6.84	100.4	20
Turnip tops	.0152	6.58		
Walnuts	.0092	4.00	2.0	100
Wheat, entire	.0219	9.50	9.0	150
Wheat bran	.0341	14.76	17.7	43

Iron-- Table II.

The Iron Content of Fruits.

The following table shows in column (1) the amount of food iron calculated as grains of metallic iron in one ounce of foodstuff. (2) The percent of one day's iron ration (.213 grains) in one ounce. (4) The percent of the iron ration found in 100 calories. (7) The number of calories in an ordinary serving.

	(1)	(2)	(4)	(7)
Apples	.0015	.56	3.2	100
Apples, dried	.0035	2.80	3.2	100
Apple juice	.0009	.39	3.0	100
Apricots	.0013	.56	3.5	50
Apricots, dry	.0061	2.64	3.5	50
Bananas.	.0026	1.12	4.0	100
Blackberries	.0026	1.12	7.0	50
Blueberries	.0039	1.7	8.0	50
Breadfruit				
Cantaloupe	.0013	.56	4.7	75
Cherries	.0018	.78	3.4	50
Cherry juice	.0013	.56	2.5	100
Cranberries	.0026	1.12	9.0	40
Currants, fresh	.0022	.94	6.0	50
Currants, dry, Zante	.0109	4.72	6.0	140
Dates	.0131	5.67	6.0	100
Figs		5.67	6.3	180
Figs, fresh	.0144	1.47	6.3	60
Gooseberries	.0022	.95	6,0	40
Grapefruit	.0013	.56	4.0	50
Grapes	.0013	.56	2.0	100
Grapejuice	.0013	.56	2.0	100
Guava				
Huckleberries	.0039	1.69	8.0	50
Lemon juice	.0026	1.12	9.0	

Table II.

				k
Mango				
Muskmelon	.0013	.66	5.3	73
Olives	.0127	5.49	6.5	100
Oranges	.0039	1.69	2.6	75
Orange juice	.0039	1.69	3.0	75
Peaches	.0013	.56	5.0	50
Peaches, dry	.0053	2.29	5.0	50
Pears	.0013	.56	3.1	75
Pear juice				
Persimmons				
Pineapple	.0022	.95	8.0	50
Plums	.0022	.95	4.0	100
Prunes, dry	.0131	5.67	7.0	100
Raisins	.0092	4.00	9.2	100
Raspberries	.0026	1.12	6.0	75
Raspberry juice				
Strawberries	.0035	1.51	13.7	45
Tomatoes	.0018	.78	11.7	25
Tomato juice				
Watermelon	.0013	1.74	5.6	75

.0035

Iron-- Table II a.

FRUITS WHICH HAVE THE LARGEST IRON CONTENT.

	(1)	(2)	(4)	(7)
Currants, dry, Zante	.0109	4.72	6.0	135
Dates	.0131	5.67	6.0	100
Figs, dry	.0131	5.67	6.3	180
Olives	.0127	5.49	6.5	100
Prunes	.0131	5.67	7.0	100
Raisins	.0092	5.2	6.8	100

Iron--Table IIIa.

THE IRON CONTENT OF NUTS

The following table shows the iron content of nuts. Column (1) gives the amount of food iron calculated as grains of metallic iron in one ounce of foodstuffs. (2) The percent of one day's iron ration(.213 grains) in one ounce. (4) The percent of the iron ration found in 100 calories. (7) The number of calories in an ordinary serving.

	(1)	(2)	(4)	(7)
Almonds	.0171	7.35	4.0	100
Chestnuts	.0031	1.30	2.0	100
Coconut, dry				
Coconut, fresh	.0051	2.21	2.0	110
Hazelnuts (filberts)	.0179	7.75	4.0	100
Peanuts	.0088	3.88	2.4	100
Pecan nuts	.0114	4.93	2.3	100
Walnuts	.0092	4.79	2.67	100

THE IRON CONTENT OF CEREALS AND BREADS

The following table shows in column (1) the amount of food iron calculated as grains of metallic iron in one ounce of foodstuff. (2) The percent of one day's iron ration (.213 grains) in one ounce. (4) The percent of the iron ration found in 100 calories. (7) The number of calories in an ordinary serving.

	(1)	(2)	(4)	(7)
Barley, entire	.0179	7.75	7.6	
Barley, pearled	.0088	3.80	3.8	100
Bread, Boston Brown	.0131	5.6	9.0	100
Bread, entire wheat	.0070	3.03	4.3	150
Bread, graham	.0109	4.70	6.4	150
Bread, rye	.0070	3.03	2.6	150
Bread, entire rye (pumpernickel)	.0088	3.81	6.5	120
Bread, white	.0039	1.70	2.3	150
Corn, whole	.0127	5.50	5.0	
Cornmeal	.0029	1.70	2.0	75
Cottonseed meal				
Crackers	.0066	3.00	2.4	110
Farina	.0035	1.51	1.5	100
Flour, buckwheat	.0053	2.30	2.3	
Flour, entire wheat	.0110	4.72	4.7	
Flour, graham	.0162	7.00	7.0	
Flour, white	.0044	1.90	2.5	
Flour, rye	.0057	2.47	2.5	
Flour, rye entire	.0146	6.34	6.3	
Hominy	.0040	1.69	1.3	100
Linseed meal				
Macaroni	.0053	.51	2.2	100
Millet				
Oatmeal	.0166	7.19	6.4	75

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Rice, polished	.0039	1.68	1.7	125
Rice, brown	.0088	3.81	4.0	100
Rye flour	.0057	2.47	2.5	100
Rye, entire	.0171	7.40	9.6	100
Tapioca	.0070	3.03	3.0	100
Wheat, entire	.0219	3.9	4.3	150
Wheat, bran	.0341	4.2		
Wheat, germ				

Iron-- Table V

THE IRON CONTENT OF VEGETABLES

The following table shows in column (1) the amount of food iron calculated as grains of metallic iron in one ounce of foodstuff. (2) The percent of one day's iron ration. (.213 grains) in one ounce. (4) The percent of the iron ration found in 100 calories. (7) The number of calories in an ordinary serving.

	(1)	(2)	(4)	(7)
Asparagus	.0044	1.90	30.0	10
Beans, lima, fresh	.0083	3.80	10.7	25
Beans, string, fresh	.0048	2.08	17.7	25
Beets	.0026	1.12	9.0	25
Brussels Sprouts	.0048	2.08	23.4	25
Cabbage	10048	2.08	23.4	25
Carrots	.0025	1.12	9.0	50
Cauliflower	.0036	1.12	13.0	25
Corn, sweet, fresh	.0035	1.50	4.8	75
Cucumbers	.0009	.40	8.0	10
Eggplant	.0022	.95	12.3	10
Kohl-rabi	.0026	1.12	9.0	35
Mushrooms				
Okra				
Onions	.0026	1.12	700	35
Parsnips	.0026	1.12	6.0	55
Potatoes	.0057	2.47	10.4	75
Potatoes, sweet	.0022	.95	2.6	100
Pumpkin	.0035	1.51	8.7	25
Radishes	.0026	1.12	13.7	6
Rutabagas				
Squash	.0026	1.12	.9	50
Turnips	.0022	1.47	11.4	50

Iron--Table VI

THE IRON CONTENT OF LEGUMES

The following table shows in column (1) the amount of food iron calculated as grains of metallic iron in one ounce of foodstuff. (2) The percent of one day's iron ration (.213 grains) in one ounce. (4) The percent of the iron ration found in 100 calories. (7) The number of calories in an ordinary serving.

	(1)	(2)	(4)	(7)
Beans, dry	.0306	13.25	13.5	125
Beans, lima, dry	.0306	13.25	13.3	25
Beans, soya	.0248	10.73	9.2	100
Cow peas				
Cottonseed meal				
Lentils, dry	.0377	16.32	19.5	100
Linseed meal				
Peas, dry	.0249	10.78	11.0	100
Peas, green	.0074	11.35	13.7	100

Iron--Table VII

THE IRON CONTENT OF GREENS

The following table shows in column (1) the amount of food iron calculated as grains of metallic iron in one ounce of foodstuff. (2) The percent of one day's iron ration (.213 grains) in one ounce. (4) The percent of the iron ration found in 100 calories. (7) The number of calories in an ordinary serving.

	(1)	(2)	(4)	(7)
Celery	.0022	.95	18.0	5
Chard	.0100	4.70	44.0	35
Dandelion greens	.0118	5.11	30.0	50
Endive	.0106	4.6	50.5	25
Lettuce	.0031	1.34	52.3	5
Mustard greens	.0213	9.22		
Paprika				
Romaine	.0525	22.73		
Spinach	.0158	6.84	100.4	20
Turnip Tops	.0152	6.58		
Watercress	.0083	3.60		10
		Av. 6.56 Av	Av. 46.4	

Iron--Table VIII

THE IRON CONTENT OF ANIMAL FOODS

The following table shows in column (1) the amount of food iron calculated as grains of metallic iron in one ounce of foodstuff. (2) The percent of one day's iron ration (.213 grains) in one ounce. (4) The percent of the iron ration found in 100 calories. (7) The number of calories in an ordinary serving.

	(1)	(2)	(4)	(7)
Dairy Products				
Milk, whole	.0011	.47	23	120
Milk, skimmed	.0011	.47	4.5	65
Milk, condensed sweetened	.0036	1.12	1.3	180
Buttermilk	.0011	.50	4.7	75
Cheese	.0057	2.42	2.0	65
Cheese, cottage	.0042	1.82	5.8	60
Cheese, yogurt	.0043	1.84	1.7	50
Cream	.0010	.43	.7	125
Butter	.0009	.40	2.86	100
Whey				
Milk, Human	.0023	1.05	5.0	100
Eggs				
Eggs	.0111	5.67	1.36	80
Egg, one(1.86oz.)	.0244	10.54		80
Egg yolk	.0376	16.32	15.3	100
Egg yolk on one egg (6 oz.)	.0226	9.4		60
Egg white	10004	.17	1.3	14
Egg white, one egg (1.26 oz.)	.0005	.20		17
Meats				
Beef, all lean	10170	7.36	30.0	100
Beefsteak, med. fat	.0097	4.20	10.48	160
Chicken	See Beef.			
Fish	.0029	1.3	15.3	200
Blood	.2301	2.8		

	H_2O	Ash		CaO		Fe		Lime		Iron	
	%	%dry	Moist	dry	moist	dry	moist	(1)	(2)	(1)	(2)
	First analysis			2.55		.015					
1 Mt Spinach	85.6	23.0	3.3	2.04	.29	.0135	.0019	1.27	8.5	.008	3.9
2 Lamb's Quarter	85.3	23.3	3.4	2.95	.43	.0142	.0021	1.90	12.5	.009	4.3
				3.94		.036					
3 Red Root	81.9	17.6	3.2	4.08	.74	.0347	.0063	3.24	21.6	.028	12.9
				1.65		.0175					
4 Purslane	91.1	16.9	1.7	2.06	.20	.0196	.0019	.88	5.8	.008	3.9
5 Rainbow Chard	90.9	20.3	1.8	1.8	.16	.0227	.0021	.70	4.7	.009	4.3
6 New Zealand Spinach	92.3	23.9	1.8	1.48	.11	.0264	.0020	.48	3.2	.009	4.1
7 Quinoa	88.7	23.5	2.7	1.45	.16	.011	.0012	.70	4.7	.005	2.7
8 Turnip Tops	93.3	19.1	1.3	3.59	.24	.0343	.0023	1.05	7.0	.010	4.7
9 Narrow Leaved Dock	86.6	14.5	2.0	1.66	.23	.0478	.0065	1.00	6.7	.028	13.4

"Heidelberg Latest News"--"Heidelberg Advertiser"

Heidelberger Neueste Nachrichten--Heildelberger Anzeiger

(no date on clipping)

CHEAP FOOD IS THE HEALTHIEST

We Need A Thorough Reform in Our Diet.

By
Dr. M. Hindhede
(Denmark)

Dr. M. Hindhede, M.D., Danish nutrition specialist known all over the world, is now touring Germany with the purpose of applying in this country his methods in nutrition. --In the following extremely interesting sketch this savant narrates how his researches have shown that the cheapest diet proves also to be the healthiest.

If the saying be true that one cannot be a prophet in his fatherland, it surely is disproven in my case. Back in 1909, the Danish government has erected a laboratory for me and since then my ideas met with keen approval. Physiologists of other countries, among them those in Germany, have for a long time not only denied me recognition but even declared me to be mentally deranged. However, the modern tendencies toward newer methods in nutrition now promoted the world over illustrate that I was wronged and that my ideas are correct. Today most of my former adversaries agree with me.

There are two arguments in favor of the method of dieting which I am offering: this is healthier and also cheaper as compared to the way of living. Of course, my method is not strikingly original.

Many must have practiced it before from the time of Adam and Eve on. But the it was the need, and now it is the science which shows the way. Potatoes and barley gruel were and are the poor peoples fare. This diet was used only by the needy. For the first time in our century the scientific researches have found that potatoes, rye and barley, in combination with vegetables and fruits should not be considered the poor man's fare for they are the most important nutritional elements for the human body.

Man especially overeats proteins.

Physiologists ask me, how can I prove this? I have proven it. For scores of years I have conducted nutritional researches on men in my laboratory. I have myself lived one year on potatoes and other vegetable food; one man among my experimental subjects lived several years on potatoes alone, and another man 8 months on barley gruel. And all of us have not suffered any injury to our health but have grown healthier and stronger into the bargain! I have repeated these experiments many a hundred times and in each case without exception I found that renunciation of animal food not only does no harm but on the contrary a great deal of good in all respects! It follows that human body can very well replace the animal foodstuffs by the vegetable products. Vegetables contain protein as butter and flesh, even in a greater proportion! Why should we then spend much money on flesh, butter and eggs, when we find vegetables to be cheaper and more nourishing?

A great historical experiments has demonstrated the correctness of my thesis: in 1927 (1917? T.B.) the United Denmark closed the import of food products--barley, potatoes and milk--,fearing the Danes would sell their own products to Germany. Then we faced the fatal problem: Denmarl had not sufficient food stock to meet the needs of its people in the heretofore usual manner. What should happen?--At that moment, when

advice was much needed I have offered the government a far-reaching plan. At that time I declared:

"Either pig or man--one or the other have to yield the right to live".

The slaughtered pig gives back only 15% of the vitamines and proteins which he has taken in form of food. 85% of vital nourishing material are being wasted. But if we ourselves eat barley and potatoes which we feed to the pigs, we would lead a less expensive life, be independent from the import of foreign stock and gain 85% of vitamines and proteins. The Danish people and government accepted this motion and this started the so much scandalized "pig slaughtering". Also the remaining breed was strictly confined. What was the result? According to the statistics, never was such a remarkably fine health noticed among the Danes or any other peoples as in our country during 1917 and 1918. The death rate rapidly dropped down. Cases of diseas diminished to a remarkable extent. Even a later epidemic, brought in from abroad could not overpower the general healthy condition. This radical course in the nutritional methods in Denmark have proved very fruitful and are bringing good results today.

Barley gruel is one of our national dishes.

We eat a great deal of coarse-ground bread, containing no indigestible wheat, but made of rye flour and about 15% of bran, the essential ingredients being vitamines, proteins and salts. The use of butter in Denamrk is exceptionally insignificant. The peasants eat hardly any animal butter but use vegetable butter. This put us in the position where we can export butter in large quantity (Denmark owns one third of the world's butter export) and in this manner enables us to profit by the poor nutritional methods of other lands. We, too, have learnt a great deal in 1917 and 1918.

I am not going to restrict my examples to my native land. You surely must have heard about the Irish peasants whose staple food is potatoes and who for that reason are expected to have "potato abdomen". I have personally stayed in Ireland for months at a time. I found that the general health of the Irish was superior, because of potato-eating; there can be no mention of "potato-abdomen". I am in continual communication with training institutions of all Europe where the pupils are brought up on a stricly or a partly vegetable regime. All these institutions have made the statistic confirmation that in both cases of such diet the young men have remarkably thriven. I have just stopped again for a few months at the "Fruit Culture Settlement" Oranienburg (Orangetown) near Berlin; I have made observations of their inmates as a physician. In this case again I can quote a remarkable healthy condition which is credited to the purely vegetable diet.

Such a reform in the food which I am offering you will be of greatest importance naturally not for separate individuals alone, but as well for the whole science of domestic economy. Had man not squandered away a large part of nutritive substances for flesh industry he would have knwon how to cut down to a large extent the universal standard of living. Germany produces double the amount of potatoes (and also rye) compared to that raised in Denmark. Why should her cattle devour so much of her food products? Why should she buy from aborad expensive animal foods, when she possesses herself in abundance the healthiest and the cheapest foods such as potatoes, rye, barley, bran, vegetables and fruit?

Translator:
Tatiana Boldyreff.

613.2

F O O D S .

Fats.--

Found in both plants and animals.

In plants usually in the seeds.

Sometimes in fruits as in the olive.

Fat is composed of palmitin, stearin, and olein.

Palmitin and stearin are solids, olean a fluid.

Palmitin and stearin held in solution by olean, at the temperature of the body.

Butter contains butyrin.

Heat and fermentation decompose fats into glycerine and fatty acid.

Fatty acids have a rancid odor.

Alkali is in contact with fats and also decompose them.

The alkali takes the acids setting the glycerine free, thus forming soap.

Soap solution disolves fats.

Stearin the chief constituent of solid fats as beef and mutton suets.

Palmitin more abundant in the humanbody tissues than stearin.

Olean the most abundant of all in human body.

Composition of olein $C_{21} H_{38} O_6$

Composition of Palmitin $C_{19} H_{36} O_6$

Composition of stearin $C_{21} H_{40} O_6$

Fats contain less oxygen than starch and sugar.

Vegetable oils contain more olein than the animal fats, and in this respect are more nearly allied to human fats than are beef and mutton fats and butter.

Edible oils are found in many nuts, especially olives, cucumbers, and sunflower seeds, almonds, peanuts, &c.

Vegetable oils contain less active volatile acids than animal oils especially butter.

Experiments:--

1. Show the presence of oil in nuts by crushing the nuts and extracting the oil with ether.

2. Show crystals of stearin under a mucroscope.

3. Show the effects of heat upon butter and olive oil.

4. Exhibit a specimen of olive oil and a specimen of butter which have been kept together in a warm place.

   The butter more rancid than the olive oil.

   When heated together the butter gives off less accurate volatile acids, and this is one reason why cooked butter is less digestible than olive oil.

   Vegetable oil more digestible than animal oil.

The last two experiments to be used to illustrate hygiene.

F O O D S .

Salts:--

Found in the body of all animals and vegetables in a combination of organic substances chiefly the nutritious of albumenoid substances.

Not really in the form of organic salts but in a semi organic condition.

The most important salts are calsium phosphate, calsium carbonate, sodium phosphate, sodium carbonate, and sodium chloride.

Chemical substances are not foods, although the animal body sometimes produces useful substances allied to purely chemical compounds such as HCl, probably an inorganic combination and not a chemical substance.

As ordinarily HCl is found to be much less potent than the gastric juice. (1/2)

The pussmoth in a larva state secretes a strong solution (40%), of formic acid for a defensive purpose. Ejects 1/20 of a gram at a time.

613.2
P 1

ARTICLES OF FOOD, THE ADVISABILITY OF WHOSE USE IS QUESTIONABLE EVEN IN THE DIET OF WELL PERSONS, HAVE BEEN MADE A PART OF THE PERSCRIPTIONS OF THE SICK WHO WOULD IN MANY CASES DO MUCH BETTER WITHOUT THEM. TRUE, THE APPETITE CRAVES THEM, BECAUSE IT HAS BEEN EDUCATED TO THEIR USE, ND THE DISSUSE OF THESE THINGS WILL BE GREATLY FELT. BUT THE ONLY RIGHT COURSE IN THSE CASES IS TO EDUCATE THE CONSCIENCE. LAY BEFORE THE SICK THE EFFECT OF THESE THINGS UPON BOTH THE MENTAL AND PHYSICAL POWERS. SHOW THEM THE TENDANCY WHICH THEY HAVE TO WEAKEN THE CONSTITUTION AND INDUCE DISEASE. IT SHOULD BE THE WORK OF THE GOD-FEARING PHYSICIAN TO GUIDE THE MINDS OF HIS ~~PATIE~~ PATIENTS TO RIGHT PRINCIPLES. IF THEY ARE LEFT TO FOLLOW THE NATURUAL BIAS OF THEIR OWN MINDS, THEY WILL FROM FORCE OF HABIT, INDULGE APPETITE AT THE EXPENSE OF HEALTH AND EVEN OF LIFE.

IF THE PHYSICIANS ENJOY ANIMAL FOOD, AND HAVE ACCUSTOMED THEMSELVES TO ITS USE , THEY WILL BE INCLINED TO PERSCRIBE IT FOR THEIR PATIENTS AND FOR HELPERS. THEY MAY PLEAD THAT THEY ARE CONSCIENTIOUS IN THE MATTER, BUT IF THEY HAVE BECOME INTELLIGENT UPON THE QUESTION OF HEALTH REFORM, IF THEY REASON FROM CAUSE TO EFFECT, THEY WILL SEE THAT A FREE USE OF FLESH ~~MAE~~ MEATS IS NOT GENERALLY BEST

FOR INVALIDS.

THE PHYSICIAN SHOULD KNOW WHAT KIND OF A CONSCIENCE HE IS BEING GUIDED BY, WHETHER A GOOD CONSCIENCE, OR A BAD ONE. WHEN IN HIS COUNSEL HE IS FOLLOWING THE LEAD OF HIS OWN INDULGENCE OR PERVERTED APPETITE, OR WRONG PRACTICES, SHALL HIS CONSCIENCE BE REGARDED AS THE CRITERION FOR OTHERS, OR A SAFE- GUIDE EVEN FOR HIMSELF? . .....

THEN WHAT IS THE SPECIAL WORK IN ALL OUR HEALTH INSTITUTIONS. I INSTEAD OF EDUCATING THE APPETITE TO INDULGENCE, WHICH IS THE GREAT CAUSE OF DISEASE, INSTRUCTION MUST BE GIVEN IN REGARD TO DENIAL OF APPETITE AND CONTROL OF THE PASSIONS. THE KNOWLEDGE OF SIN, AND THE KNOWLEDGE OF SALVATION FROM ITS BONDAGE AND ITS DEFILEMENT, MUST BE PLAINLY GIVEN TO ALL, BE THEY HIGH OR LOW, RICH OR POOR, IN CAREFULLY PREPARED LECTURES.

THE TRUE DISCIPLE IN THE SCHOOL OF CHRIST, HE WHOSE MIND IS IN HAR HARMONY WIT THE MIND OF GOD, WILL NOT ONLY BE CONSTANTLY LEARNING, BUT TEACHING AS WELL, CONSTANTLY REFLECTING LIGHT, LEADING UPWARD AND AWAY FROM THE PREVAILING ERRORS OF THIS PREVERSE AND ADULTEROUS GENERATION. ANY MAN, PHYSICIAN, TEACHER OR SUPERINTENDANT, ANY ONE IN ANY OFFICE OR ANY HELPER, WHO SHALL NEGLECT HIS SOLEMN OBLIGAT TION IN THIS MATTER, AND PERSIST IN FOLLOWING HIS OWN PLANS AND IDEAS IS A FALSE GUIDE LIKE A SIGN BOARD POINTING IN A FALSE DIRECTION. ~~HIS WISDOM~~ HE IS BLINDLY AND UNCONSCIOUSLY, BUT CERTAINLY LEADING AWAY FROM GOD

AND EVADING HIS TRUTH, IN GIVING CONSENT TO ERRORS IN DIET AND CONDUCT WHICH WILL END IN THE RUIN OF THE SOULS AND BODIES OF THOSE FOR WHOM CHRIST HAS DIED.

ALL WHO ARE CONNECTED WITH OUR INSTITUTIONS, SHOULD SET THEIR OWN HEARTS IN ORDER, AND SEE THAT IN THEIR OWN HABITS OF EATING AND DRINKING AND DRESSING, IN THEIR COUNSEL, THEIR PRESCRIPTIONS, THEIR EXAMPLE OF TRUE NOBILITY OF CHARACTER, IN SHORT, IN THEIR EVERY PRACTICE, THEY ARE IN ACCORDANCE WITH THE HOLY PRECEPTS OF GOD'S WORD, SHOWING TO ALL A LIVING REPRESENTATION OF 'THE WAY OF THE LORD.' THOSE WHO OCCUPY RESPONSIBLY POSITIONS, AND DO NOT WALK IN THIS WAY THEMSELVES, CANNOT GUIDE THE FEET OF OTHERS THEREIN. .....

I HAVE TRIED TO PRESENT TO YOU THE INFLUENCE THAT SHOULD BE EXERTED IN OUR INSTITUTIONS FOR THE BENEFIT OF SICK AND SUFFERING HUMANITY. WILL THOSE WHO THINK IT AN EASY MATTER TO CONDUCT SUCH INSTITUTIONS, CONSIDER THIS MATTER FROM A CHRISTIAN STANDPOINT. WHERE ARE THOSE WHO WILL PUT SELF ASIDE, AND MAKE GOD SUPREME, ENTERING INTO THEIR WORK WITH TRUE MISSIONARY SPIRIT?

WHERE ARE THE SELF-DENYING, SELF-SACRIFICING MEN AND WOMEN, WHO HAVE A SENSE OF WHAT SUCH AN INSTITUTION DEMANDS, AND WHO WILL GO TO WORK ON SUCH PRINCIPLES, IN ACCORDANCE WITH THE LIGHT GOD HAS GIVEN ME, WHO WILL SEEK THE WAY OF THE LORD, WHO WILL BE ENTREATED AND CORRECTED, WHO WILL NOT BUILD UP SELF AT THE EXPENSE OF OTHERS, A

WE ARE HEALTH-REFORMERS,-SEEKING TO COME BACK AS FAR AS WE CAN TO THE LORD'S ORIGINAL P LAN IN REGARD TO DIET. MEAT-EATING WILL EVENTUALLY BE DONE AWAY,AND THE FLESH OF ANIMALS WILL NO LONGER FORM A PART OF OUR DIET.

WHEN GOD LED THE CHILDREN OF ISRAEL OUT OF EGYPT, IT WAS HIS PURPOSE TO ESTABLISH THEM IN THE LAND OF CANAAN, A PURE,HAPPY, HEALTHFUL PEOPLE. LET US LOOK AT THE MEANS BY WHICH HE WOULD ACCOMPLISH THIS. HE SUBJECTED THEM TO ACOURSE OF DISCIPLINE, WHICH HAD THEY CHEERFULLY FOLLOWED IT,WOULD HAVE RESULTED IN GOOD, BOTH TO THEMSELVES AND TO THEIR POSTERITY. HE REMOVED FLESH-FOOD FROM THEM IN GREAT MEASURE. HE HAD GRANTED THEM FLESH IN ANSWER TO THEIR CLAMORS, JUST BEFORE REACHNING SINAI, BUT IT WAS FURNISHED THEMEX FOR ONLY ONE DAY. GOD MIGHT HAVE AS EASILY PROVIDED THEM WITH FLESH AS WITH MANNA BUT A RESTRICTION WAS PLACED UPON THEM FOR THEIR GOOD. IT WAS HIS PU PURPOSE TO SUPPLY THEM WITH FOOD BETTER SUITED TO THEIR WANTS THAN THE FEVERISH DIET TO WHICH MANY OF THEM HAD BEEN ACCOSTOMED IN EGYPT. THE PERVERTED APPETITE WAS TO BE BROUGHT INTO A MORE HEALTHY STATE, THAT THEY MIGHT ENJOY THE FOOD ORIGINALLY PROVIDED FOR MAN, THE FRUITS OF THE EARTH,WHICH GOD GAVE TO ADAM AND EVE IN EDEN. HAD

HAD THEY BEEN WILLING TO DENY APPETITE IN OBEDIENCE TO HIS RESTRICTIONS, FEEBLENESS AND DISEASE, WOULD HAVE BEEN IUNKNOWN AMONG THEM. THEIR DESCENDANTS WOULD HAVE POSSESSED PHYSICAL AND MENTAL STRENGTH; THEY WOULD HAVE HAD CLEAR PERCEPTIONS OF TRUTH AND DUTY, KEEN DISCRIMINATION,AND SOUND JUDGMENT. BUT THEY WERE UNWILLING TO SUBMIT TO GOD'S REQUIREMENTS,AND THEY FAILED TO REACH THE STANDARD HE HAD SET FOR THEM,AND TO RECEIVE THE BLESSINGS THAT MIGHT HAVE BEEN THEIRS. THEY MURMURED AT GOD'S RESTRICTIONS, AND LUSTED AFTER THE FLESH POTS OF EGYPT. GOD GAVE THEM FLESH,BUT GAVE THEM HIS CURSE WITH IT.

YOU ARE ALL ACQUAINTED WITH THE LIGHT GOD HAS GIVEN UPON THIS SUBJECT OF HEALTH-REFORM. I HAVE BEEN SHOWN AGAIN AND AGAIN THAT GOD IS TRYING AS HE DID WITH ISRAEL TO LEAD US BACK TO HIS ORIGINAL DESIGN, NOT OF SUBSISTING UPON THE FLESH OF DEAD ANIMALS, BUT TO PRACTISE AND TEACH THE PEOPLE THE BETTER WAY OF LIVING UPON THE NATURAL PRODUCTS OF THE EARTH. I CANNOT THINK THAT IN THE PRACTISE OF FLESH-EATING WE ARE IN HARMONY WITH THE LIGHT GOD HAS BEEN PLEASED TO GIVE US. ESPECIALLY IN OUR HEALTH INSTITUTIONS, SHOULD ALLL CONNECTED WITH THEM BE EDUCATING THE TASTE TO SUBSIST ON FRUITS, GRAINS AND VEGETABLES. IF WE MOVE FROM PRINCIPLE IN THESE THINGS, IF WE AS CHRISTIAN REFORMERS EDUCATE OUR OWN TASTE, AND

BRING OUR DIET TO GOD'S PLAN, THEN WE MAY EXERT AN INFLUENCE UPON OTHERS WHICH WILL MEET THE MIND OF THE SPIRIT OF GOD.

AND WHO WILL MAKE CHRIST FIRST,LAST AND BEST IN EVERYTHING. AN INSTITUTION CONDUCTED ON ANY OTHER PRINCIPLE,WILL PROVE A CURSE RATHER THAN A BLESSING IN THESE PERILOUS TIMES.

IN OUR EXPERIENCE IN THE ESTABLISHMENT OF SUCH INSTITUTIONS, WE HAVE SEEN HOW DIFFICULT IT IS FOR MEN TO YIELD THEMSELVES TO BE MOLDED BY THE SPIRIT OF GOD; HOW DIFFICULT IT IS FOR THOSE WHO THINK THEMSELVES VERY CONSCIENTIOUS TO YIELD THEIR OWN WILLS AND THEIR OWN WAYS TO GOD"S WILL AND GOD'S WAY.

Food is one of the mightiest forces of the universe. Health, happiness, ability to do and indeed the manner of men and women we are, depends in a great measure upon the food we eat. Yet very few people ever stop to consider what particular foods are best suited to the maintenance of perfect health, but whatever gratifies the palate or is most conveniently obtained is eaten without regard to its dietetic value. Evidently it was the design of the creator that the primal purpose of eating should be the reparation of waste air the building up of tissue, muscles, bones and brains and that this might be a pleasure to us it was associated with the delights of appetite. Most people have overlooked the first object and make taste the criterion by which the value of food is governed. Give us something good to eat is the great cry of humanity. Good our food should certainly be but its goodness should be guaged not alone by the amount of pleasure it imparts to the palate but by its fitness to be used in making and keeping our bodies so pure and strong and full of health that we may fulfil the purpose of existence in the best and truest manner. The fitness of food for this purpose depends upon its nutritive value its digestibility and its palatableness. The first requisite must be attained by the proper selection of material the other requisites depends mainly upon its after preparation for even the best of material may be so prepared as to be totally unfit for use by the system. In the selection of material for food we need to bear in mind that the various tissues of the body are so diverse in character that in order to supply each with the requisite building material it is necessary

that one food should contain a variety of elements, perhaps this will be easier to bear in mind if we give a first consideration to the food elements. There are three classes of food elements, nitrogenous, carbonaceous, and inorganic, some or all of which are to be found in all foods. Besides these, most foods contain more or less water and more or less indigestible material, to the nitrogenous class belong albumen, fibrine, gluten, and caseine. The carbonaceous includes starch, sugar and fats while to the inorganic elements belong potash, carbonate of lime and such other salts. Each of these different classes of elements have a special particular work to perform in the maintenance of perfect health consequently it is necessary that our food should contain some of each one of these different classes. If the system is deprived of any one of them it suffers in some way for the lack . It is also true that the system can replace only what it has lost consequently it can use only a limited quantity of each of the different elements. If more than needed is taken it can not be used but has to be gotten rid of in some way thus often proving a great hindrance to health. Much more of the carbonaceous elements are required than of the nitrogenous. The proper proportion as determined by science being 8 to I, not all foods contain all the various food element, while most of those which do contain some of each of the different elements do not contain them in the correct proportion and need to be combined with other articles in order to make them proportionately good. Here let me call your attention to this chartwhich will perhaps emphasize what I have

said regarding the points to be considered in the selection of food. A knowledge of the analysis of food ought to form part of the education of every woman in the land, especially of every woman who in any capacity has the responsibility of arranging the bills of fare or preparing the food for the household.

But the proper selection of material is not all the food, after being well selected must be properly cooked so as to make it easily digestible and readily assimilated. The evils of bad cookery are manifold so many indeed that it has been calculated that they far exceed the evils resulting from strong drink. Much of the previshness, hot temper, weak will with which humanity is affected has been attributed no doubt justly to the badly cooked foods which so frequently grace or rather disgrace the tables of our land.

The proper preparation of food is of the greatest importance, but it is one of the curious things of our ethics that this most important subject is one which receives but little thought and study. Cookery is too generally looked upon as a menial service and its performance relegated to persons who have not the first conception of what constitutes healthful food although they can go through the mechanical process of mixing ingredients. But the mere putting together of certain materials is by no means all. The proper preparation of food involves both chemical and physical processes which necessitates careful study as a thorough understanding of scientific principles to insure success. Life holds no more responsible position than the one upon which depends in so great a measure the health and happiness of the family

circle. What higher mission can one conceive than to intelligently prepare the wherewithal to make shoulders strong to bear lifes burdens and heads clear to solve its intricate problems, what worthier work than the building up of bodies into pure temples fit for grand guests of thought and purpose and surely no one should undertake such responsible work in ignorance of the laws that govern health and nutrition. There is a trite saying about plain living and high thinking and I believe the reverse is equally true. It is just as easy to furnish our tables with well cooked easily digested food as to supply it with any other if we only have the knowledge and the will and indeed-

We cook food for several reasons to make it more palatable, more pleasing to the eye, to facilitate mastication and principally to make it more digestible, Starch one of the food elements and one which enters very largely into the composition of many foods is quite indigestible in an uncooked state. Cookery indeed should be a partial preliminary digestion of the food elements, when properly done it changes the various elements except fat in much the same manner as do the digestive juices.

Heat applied in some form is the agent by which the cookery of food is accomplished. The methods usually employed are boiling, simmering, stewing, steaming, roasting, broiling, baking. Among the most wholesome articles of food are the Cereals. This class of foods includes wheat, oats, barley, maize, rice, rye, and their various mill products.

The grains resemble each other in composition varying only in the relative amount of their proximate elements, all contain nitrogenous elements in the form of gluten, albumen. Comparing them with

other foods wheat and oats contain more than double the amount in the same quantity of beef or mutton.

Proper proportion approach more nearly perfect foods.

How prepared by milling. Barley considered oldest of all cultivated grains. Oatmeal justly ranks high, as a nutritive food, the grains simply because they are grains should not be considered meritorois articles because unless well cooked they may be exceedingly objectionable. Have seen oatmeal and other grains upon the table which were far from being healthful foods. Prolonged cooking eaten without attempt at mastication excess of sugar boiling water, trouble to cook, measure latent heat, stirring meals, grains for breakfast.

GRAINS.

Examining this chart we find that the class of foods which rank highest both in the percentage of the nutritive elements they contain and the proper proportion of these elements are the grains . For this reason we shall give the grains the first place on the list of foods we shall take up in this series of lessons. ~~Take~~ Ha grains and articles made from them hold the most important place in the dietary of man and while it is true that many articles made from grains are universally used it is also true that the grains in their unground state with the exception of an occasional dish of rice or oatmeal are very rarely found upon the average bill of fare in this country. This lack of recognition of the grain foods is undoubtedly due to a lack of knowledge respecting their most excellent qualities, As I ~~have before stated~~ They approach more nearly the perfect standard as regards amount and proportion of their nutritive elements than any other foods, they are especially economical foods, costing on an average not over five cents a pound, and when they are properly cooked and eaten they are very palatable and easy of digestibility.

The great number of grain products to be found in market make it possible to employ a greater variety of this class of foods than almost any other, so that there need be no sameness to the appetite, ~~and yet I~~ I imagine one reason why the grains are not more commonly used is because only one or two varieties are even purchased and these used exclusively until the family is tired of them. It is just as economical to buy ten pounds

of one kind.

In ancient times the grains were largely used as a staple article of diet.

The old German Soldiers whose great bodily strength excited the astonishment of the Romans lived chiefly on oatmeal porridge- The ancient Spartans also lived chiefly upon a grain diet. The most muscular men at the present time in all Europe the Scottish Highlanders, and the Russian Grenadiers who live ~~lived~~ almost wholly upon a grain diet, the one upon oats the other upon rye,

Of all the grain foods wheat ranks first because of the more nearly correct proportion of its elements, though oats , barley and rye are exceedingly nutritious foods. The cooking of grains is a very simple matter in itself but through lack of knowledge respecting the nature of the grain it is seldom properly done. The use of an improperly cooked grain is as detrimental to health as a properly cooked one is beneficial, a grain simply because it is a grain is by no means warranted to fulfil its true mission unless properly prepared.

Double boiler- It can be cooked in other utensils but requires more watching and trouble.

The grains belong to a class of foods which have lost nearly all their moisture during their ripening , which necessitates a large amount being supplied them in their preparation for the table but the different processes of milling which they undergo as also the difference in the grains themselves necessitates different quantities of fluid for cooking the different grains-

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A Meeting of The Battle Creek League.

An enthusiastic rally of the Battle Creek chapter of the Health and Efficiency League, recently held, was devoted to a discussion of the low-protein diet. It was scarcely a discussion, either, for no one ventured to uphold the high-protein theory in the face of the conclusive demonstration of the value of the low-protein ration afforded by the remarkable recoveries which Battle Creek Sanitarium patients make upon a non-meat diet.

J. H. Kellogg, M. D.

J. H. Kellogg, M. D. Referred briefly to the famous experiments made by Prof. Chittenden, of Yale, which proved the prevailing practice of beef-steak gorging to be not only unnecessary for nutrition, but actually a hindrance to health and to sustained mental and physical labor. "The popular Idea", said Dr. Kellogg "is that a man can not be strong unless he eats meat; that in order to be strong, one must eat a strong animal. The wonder is that elephant steaks are not popular, or whale's spare ribs. It is astonishing that we should be content with an ox. Somebody has suggested that since Roosevelt has visited Africa hippopotamus steak might become popular. This idea that we must have meat in order to be strong, in order to have endurance and efficiency, is beginning to disappear. It has had some very hard knocks in the last few years. Karl Mann the famous German pedestrian, made the longest walk in the shortest time that has ever been made, doing the distance from Dresden to Berlin, 124 miles, in 23 hours on a low-protein diet. I received today a letter from Mann in which he says he has just been up to Graafenburg, a little mountain town away off in Austrian Silesia close to the Russian border, on a pilgrimage to Graafenburg, the home of Priesenitz, the man to whom we owe almost every principle of modern hydrotherapy of diet reform, medical reform, and therapeutics--almost all these principles were really in operation in Graafenburg over a hundred years ago. It takes the world a long time to get hold of a new idea. When a new idea is launched into the world it has to struggle for its life. And you know, I think there isn't anything more worth while to do than to get aboard such an idea when you see it is launched and getting somewhere with it.

This low-protein idea, as I say, was born more than a moment, more than a few years, ago, over one hundred years ago, in fact; and it has been making progress all along the century; and within the last ten years ~~there have been~~ some remarkable experiments have been made. Prof. Chittenden, eight years ago, undertook, at ~~by~~ Mr. Fletcher's suggestion, a series of critical experiments to determine with accuracy, with certainty, whether a low protein diet is really better or worse for a man as regards strength, vigor, endurance, and efficiency; and the result of his experiments upon soldiers, six athletes, and four professors was to demonstrate beyond any possibility of question that strength and endurance and courage and grit are tremendously improved by a low-protein diet. He himself got rid of headaches and rheumatism which he had been suffering from along with a miserable rheumatic gout that had given him a great amount of distress, so that he was really an invalid. The other professors were invalids also, and they got well also while the six athletes doubled in strength and the sixteen soldiers more than doubled in strength, increasing not only their strength, but also their courage.

A great many people were awakened by these experiments which were published in Chittenden's book, "The Nutrition of Man," and through magazine articles and Horace Fletcher's lectures and through other ways the world came to know of these wonderful results. Since then a great many people have been making experiments along the same line.

Last year an eminent member of the New York bar, Mr. Goodwin Brown, told me of his experiences of the wonderful improvement he made by reducing his protein. After his return home from here he reduced it still more , in cutting out meats entirely. In New Haven the other day, Fisher told me that Mr. Brown had been up to see him, and was wonderfully improved. I have had repeated letters from him, and he tells me the same story--that he was wonderfully improved, and attributing it to the cutting out of meat.

One of the leading citizens of this town, the vice-president of a prominent bank of the city, ~~was talking~~ said to me the other day, "Doctor, I want to tell you something. You know I was up here to see you last December, and you took my blood-pressure and ~~you~~ found it was a little high. Now, I stopped smoking right then and there, and I have not touched beefsteak since, and I confess I am a great deal better."

Well, I was very much surprised when I met the gentleman to see him looking so well. He looked ill when I met him last December, and I was really very much pleased to find him looking so fresh and young; he seemed ten years younger.

Now, what this man had accomplished in this time by dropping out beefsteak and other harmful things--tea, coffee, and tobacco--every man in the same condition may accomplish. It is terrible to look out over the world and see the millions of men who are working for their own destruction, planning their own death, so to speak--actually committing suicide by what they are doing ignorantly.

I am satisfied with Professor Chittenden that this eating of too much protein--furnishing the body with material out of which poisons are made, and which in turn saturate the body and contaminate it with toxins--that this is the real cause of the great number of chronic diseases. A distinguished medical man who has stood bery high in authority in the United States visited us not long since, and he told me he had become thoroughly convinced that this autointoxication, arising from too much protein and from the decay of protein substances in the body, was the real cause of most chronic maladies.

I adopted a low-protein idea when I was fourteen years of age, because I was satisfied it was good. Now, quite early in my life I became interested in teaching. When about twelve years old, I made up my mind that I was to be a teacher, so I began to interest myself in everything pertaining to teaching, and among other things I got hold some of Froebel's ideas that there was a natural way in education; that there was a natural way to live. I read some of the statements by Cuvier and other naturalists to the effect that a non-flesh diet is the natural diet of man; that the natural diet of man is the same as that of the monkey, the ape, the gorilla, the champanzee and the orang-outang, so I said, "I will try it. I am not of much account; I am just a person and I will try to experiment during my life-time, doing without meat; and I will see what it will do to me." I tried it as an experiment for the first twenty-five years. For twenty-five years, I say, it was an experiment; but for the last twenty years the the evidence has been so strong that I have been thoroughly rooted and grounded and

established in my faith that the non-flesh diet is absolutely the best; that flesh was never intended to be used as human food. I have serious doubts whether it was ever intended to be used for food for any creature. Now, what has it done for me?

I was a puny boy, hardly thought worth raising. My father afterwards told me, "John, if I had supposed you were ever going to amount to anything, I would have taken more pains with you." My father had sent my older brothers to college, but so far as I was concerned, he thought it not worth while, that it did not pay to send a boy to school and let him study too much; that if he was puny it might break down his health. So he gave me orders that I must not go to school until I was twenty-one years of age. I was not allowed to learn to read until I was nine; then I went to school for three weeks, and I never saw the inside of a schoolhouse again for several years; but simply worked my way along a little. But when I got to school again, I managed to make up a little of lost time by studying nights. When I was twelve years old, I had such a desire to study that I went to work systematically from ten o'clock until one or two o'clock every night; I simply stole the opportunity. My father simply forbade me to study; but I went into rebellion, and after he was gone to bed, I got up about ten o'clock and put in three or four hours every night into study. As a result I didn't grow any after I was thirteen years of age, so that at twenty I was a pale, thin, coughing lad, and nobody thought I would live a year. Nobody thought I had any length of time to live at all, and I myself, when I found myself thirty was amazed to think I had lived so long, and thought certainly I would not live until I was forty; but here I find myself in my fifty-ninth year, and feel as though I had a much better chance for living than I had twenty-five or thirty years ago, or even forty years ago. Then I did not know what it was to be free from pain a minute. I suffered every day of my life, every minute of my life from terrible headaches. My mother had headaches before me, and I seemed to have inherited them. ~~I had terrible neuralgic pains in my side for months, so extremely painful was it~~

I had terrible neuralgic pains in my side, pains in my arm, particularly in my left arm which often I had to carry by my side for months, so extremely poinful was it. I knew nothing about robust health. But today I have better health than ever before, notwithstanding hard work--and I have had to work hard from my very boyhood; and this is entirely due to the fact that I got hold of these principles of diet reform forty-five years ago before we had all the scientific evidence we have now.

Professor Fisher, of Yale, said to me one day, "Doctor, how did you get hold of these principles so far back, when you didn't have all the scientific evidence we have now? What was it that persuaded you that they were good?" I said, "I liked the flavor of it. We know a good thing by the taste of it, and this thing had the right taste. I said to myself that the thing that was natural must be the right thing, because I had an idea, a belief that there was a great omniscient, all-wise, power, an intelligence, that is above everything, above us all--an influence at work intelligently, governing the whole universe, which knows what is best for us; that the power that made us certainly knew what was best for us, and if we could find out what was the original intention in relation to our welfare, that was the thing that would be the very best for us in every particular." That was the idea I started out on--to find what was natural.

And I find it pays. If one can eat right, if one can build his body out of right material, and keep his body free from poisons and impurities, he can do almost any other thing. I meet many people who say, "Doctor, I am broken down; I have worked so hard I am all broken down". Now it is my honest opinion that very, very few people bread down from overwork. It is wrong eating, a misuse of our physical powers in some way, and not the really useful employment of them, that breaks people down.

J. M. Bishop.

Mr. J. M. Bishop, collector of revenues in New York City gave enthusiastic support to the low-protein idea. "I was long ignorant", said Mr. Bishop, "of things that ought to have been taught me when I was in school. I lived a sedentary life, ate three square meals a day, without a sufficient amount of exercise, and with an insufficient

amount of fresh air; and the result was that, violating all these laws of health, the breakdown came, and I came here expecting to die. And I should have died, I believe, if Providence had not in some mysterious way guided me here, where I have become an enthusiast for the low-protein diet and other health principles. It seems to me ~~to-night~~ that ignorance is the greatest scourge in the world. A case in point is the farmer who leaves his potatoes to rot in the cellar to develop miasma, which lodges in the furniture, and in the carpets and curtains; eventually the child gets sick and dies and the bereaved mother, to console herself, regards it as an act of Providence which she could not understand, when, as a matter of fact, Providence had nothing whatever to do with it; it was merely rotting potatoes and ignorance on the part of the man who did not take proper precautions.

F. E. Belden.

Mr. F. E. Belden, the well known hymn composer and compiler of several volumes of hymns, said he was like the man who could tell something about horned cattle, because he had hold of the horns of one of ~~these~~ a Texas steer~~s~~ one time, and as a result performed every kind of gyration~~s~~ known. "What I had hold of, or what had hold of me", was not a Texas steer," he continued, "but catarrh by inheritance and by improper living. I tried various remedies till one day I saw an advertisement guaranteeing one hundred dollars' reward for any case of catarrh that could not be cured. I was about to try it, but fortunately I met a friend connected with the Sanitarium who told me what to do; and I have been adopting his suggestions. To aid myself of my catarrh, I ~~have~~ cut out all animal products, and I feel a great deal better. I think I can outjump any man or woman in this room tonight. ~~Not long since~~ I once paid four dollars for a pair of special glasses, but since I cut out the meat diet, I have not had to use the glasses; mu eye sight has returned to me all right; it has become young again. In Chicago two years ago, I was getting out a music book, and was under contract to have it finished by a certain time. Printers were at work on it in Cincinnati and Chicago and Philadelphia, and I was busy reading the proof and preparing the copy, when ~~and on top of all,~~ I became about sick with the hotel and restaurant diet. Finally to pull thru I secured a package of cream sticks. I took about half the contents of one package

and distributed them in my pockets, and said to my stomach, "Whenever you begin to howl for plain food enough to want these sticks, I will give you half a dozen of them to start with, and you won't have a single thing but that. I won't stop work, but will keep right on." It was over a day before I began to be hungry, and when I got hungry, I ate three sticks, and said, "I will see how long that will last you. YOu won't get any restaurant food until you begin to call for something plain and good." In about half a day I was hungry again, and ate half a dozen. I followed that process for several days, and I did more work and with a clearer head, and less strain than I ever did before.

Only a little while ago I had to work until about four o'clock one morning, on some difficult matter. As a test I ate about half a box of rice flakes, and when I got through at four o'clock in the morning I was not sleepy or tired. I was actually surprised at the result.

Professor Biddle.

Professor Biddle, of Northwestern University, cited some experiments in the low-protein diet which he made at New York University during the years 1907 to 1909. "My attention", he said, "has been brought particularly to some literature which spoke of the low-protein diet; and we began the experiments to test the endurance of students on a low-protein dietry, to see whether they could do better mental and physical work than men on a high-protein dietary. Three men agreed to put themselves on the low-protein dietary for two years. They were tested at the beginning by physical tests, and at the end, and every one of them showed an increase. To briefly summarize the results there were several other men who were working on a flesh dietary at the same time, and at several times during these two years these men were tested; they were tested at the beginning by physical tests, and they were tested at the end, and every one of these men that were matched up against the non-flesh eaters--or vegetarians as they calles us, for they laughed at us then but we were trying an experiment, and were determined to stick it out during the college course--every time, I say, the flesh-eating men came up against us, lost out in the endurance tests by about seven-tenths.

We always went ahead of them more than seven-tenths, or about 75 per cent so far as brain work was concerned, I am sure I was benefited 50 to 100 percent by my change of dietary and adherence to the low-protein diet. One man, professor of Spanish and Italian in Yale University, got up at five o'clock every day, taught classes all day long, and then went down town and taught in the Berlitz School of Languages in the evening, increased about 30 per cent in weight during those two years. His strength increased by a large percentage, while his mental work was doubled and equal to that of any other man at the University. The other tow men did work correspondingly well. At the close of the experiments in 1909, we gave tests similar to the squatting test with arms on hips, also an endurance test with the arms held in a horizontal position, and other exercises, to see just exactly how we stood at the close of the period; and in every one of the cases we excelled the men who were working on a flesh dietary.

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Translation.

Page 488. 489.

The "Soja-bean" contains according to J. Stingl and Moranski but little starch and Dextrine; what is designated as Dextrine is a mixture of different kinds of sugar, of which there exist about 12 %; the different sorts of sugar ferment easily.

The "Sojabean" contains also according to Stingl and Moranski a powerful diastatic ferment; and it surpasses in this, as some claim, any raw fruit so far known.

It is to this property that the "Sojabean" owes its employment in preparing food which is depending on processes of fermentation.

Concerning the preparation of "Soohu" "Shoya" or "Soy" or "Japanese Soya" from the "Soja-bean" and their composition compare Vol. I. page 241 and this Vol. page 194.

The "Soya" is the liquid part of the "Miso" or "Misyo". The preparation of the latter must be preceded by that of "Koji". According to O. Kellner one designates in Japan with "Koji" rice or barley which have been steamed and in which a fungus (Eurotium Oryzae) is developed. One washes the peeled grains of rice or barley, puts the same one night in water, and then in a vessel with a linnen cloth as bottom, sets it on top of a caldron and heats it. After the grains have become flexible (lithe) by the steam that passed through, i.e. after the starch has swelled, the mass is spread on mats to cool, while by manipulation a baking together of the grains is avoided. As soon the cooling has reached 28° C, a small part of the mass is mixed with the fungus or its spores and this mixture is

then spread over the entire mass of the steamed grains. This is then in a sort of a cellar left to itself for one day; on the 2nd and 3d day it is thoroughly worked by hand and sprinkled with a little water. After 3 days the "Koji" is ready.

The changes (transpositions) resp. losses have been fixed by O. Kellner with the following result:

See Table on page 488.

According to this the dry-substance of rice looses 13,29%, that of barley 19,28%; this loss is suffered almost exclusively by the carbonic hydrates; nitrogen does not loose anything worth mentioning, but a greater part turns into Amid-combinations.

The starch is partly transposed into maltose, while at the same time organic acids are formed which

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increase the ether-extract.

The "Koji" thus received serves for preparing "Miso"; the "Soja-(Miso)-Bean" selected and washed is first steamed in the same way as the rice respect. barley; the steaming only takes place longer and more often, namely 3 times, lasting each time from 8-10 hours. The steamed mass cooled to 20° C is mixed with "Koji" and kitchen-salt, whereby the peels (skins) of the beans come off; the mixture is then put in a wooden vessels, covered and left therein to ripen (mature). The maturity which will indicate itself by tasting, depends on the manner of mixing and the temperature kept thereby. The hotter one mixes, the quicker the fermentation proceeds; as also the more "Koji" is mixed with it, the.....
Thus one kind of "Miso" is ripe in

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4 days, another perhaps in 15 months. The slower the fermentation is proceeding, the more profound are the transpositions of the mass. These are generally of the same kind as in preparing the "Koji". There is no essential loss of nitrogen, but a formation of Ammonia, Ammid- and Xanthine- Combinations; the non-albuminous nitrogen-combinations were increased according to Nagaoka and Kurashima from 9,24% of nitrogen in the Soja-bean and 14,47% of nitrogen in barley to 40% of nitrogen in the fermented mass. Starch and Dextrine sank from 29,09% in the dry "Soja-bean" and from 73,87% in dry barley down to 7,33% in the fermented mass; the glycose changes into carbonic acid, butyric acid, lactic acid and alcohol (3,6%).

"The Miso" is eaten in Japan like the "Soya" in connection with other vegetable food and is in the food of the Japanese of a predominating dietetic importance. The Japanese is eating as an average pro head and day 37,5 g Miso, and sometimes the quantity reaches even 100-120 g. pro head and day.

One prepares also from "Soja-beans" by extraction of the grains and hulls by water and by precipitating with kitchen-salt a sort of cheese which by the name of "Tofu" is highly esteemed as a food. Finally the seeds are squeezed out to get the fat.

Edw. Kinch found for these pro. ducts the following percent. composition:

See page 489.

Such a preparation of course does not suit the palate of a German. and yet, according to E. Weiss there can be easily prepared

BATTLE CREEK COLLEGE,
BATTLE CREEK, MICH.

from the same some savoury German dishes; so e.g. a soup as that from beans and peas, a salad like that made from the garden-bean, or by boiling together with potatoes or rice a "purée" which resembles the italian "Polenta" and which, as Haberlandt suggestes, ought to be called "Sojenta". The taste of the dishes prepared from Soja-beans reminds one somewhat of almonds or chestnuts, otherwise it is similar to that of the garden-bean. One has also begun already to prepare from the "Soja-bean" a "meal" for kitchen-use, similar to that made from beans or peas.

From Dietotherapy, by Fitch.
p.49.

History of Cooking.

Cooking as an art has been developed from the crude methods used by primitive peoples from almost the beginning of time. The early Egyptians, it is said, had professional bakers. We read of their roasting and boiling the flesh of oxen. The Greeks attributed the discovery of bread-making to the god Pan, but bread was in use among the Chaldeans and Egyptians before the Greek gods had their inception. Ching-Nong, 1998 B.C., is reputed to have been the first who taught men the science of making bread from wheat. So we see that bread is a very ancient food, its origin being lost in the mists of antiquity. In the days of the patriarch Abraham, his wife, Sarah, made cakes which were thought to be a fit offering for angels. Prior to the bondage of the Isrealites in Egypt, baking had become a highly perfected art. The Egyptians used many varieties of flour and made cakes of various kinds and shapes. According to sacred history, one of the most important servants in the service of Pharaoh, during Joseph's régime, was a professional baker..... There is plenty of evidence that primitive peoples of all races, savage, semi-savage, and civilized, barbecued their meats over heaps of live coals, or roasted over the coals pieces of flesh cut or torn from big game.....

Prehistoric man may have lived wholly on raw food, berries, fruit, shellfish, etc., but this diet is not suited for most races of man today, although the northern Eskimo still prefers to eat his meat raw and frozen. While it is possible for man to live upon raw food for a considerable length of time, it is apparently designed by nature that a large portion of his food should be

cooked,for there are no savage races who do not practice the art of cooking,in however elementary a fashion,and progress in the scale of development and civilization is uniformly accompanied by advance in the art of cooking.

Of ancient British cookery very little is known;no doubt it was crude. We find little mentioned of the art of cooking in the Saxon Chronicles. The Danes and Germans appear to have been great drinkers and to have paid little attention to the preparation of foods.The.Normans were more particular in these matters;some offices among them were held by right of the kitchen. We do know,however,that the mortar was extensively used by the Anglo-Saxons and that oil and lard were used instead of butter.

The French were the first to introduce art into the process of preparing foods,but it was not until the introduction of Italian taste by the princesses of the House of Medici that cooking became an art. The ancient use of oil was modified through the discovery made by the French of dressing meat in its own gravy,and at the present day it is universally admitted that the French cook is a true gastronomic artist,and it is for his perfection in this art that all the hotels of any importance in this country employ a Frenchman to fill the post of chef de cuisine. The estimation in which his services are appreciated may be understood by the large salary attached to this office in fashionable hotels and club houses.....

During the past decade the art of cooking as a branch of woman's education has been given considerable attention in this country. Domestic science classes,in connection with universities and other institutions of learning for young women,have been established in New York,Boston,Philadelphia,and other places.

Report of Bacteriological Study of Soy Acidophilus

"At the request of Dr. John Harvey Kellogg I have made a careful bacteriological study of cultures of the Lactobacillus acidophilus grown in a milk like medium prepared from the soy bean to which was added 2 to 4 per cent of lactose.

"The cultures were made in the usual manner by inoculating thoroughly sterilized soy bean milk with a standard culture of L. acidophilus and placing the culture tubes in an incubator maintained at approximately 100° F. Among other observations made I have noted especially the following:

"1. In soy milk L. acidophilus grows more rapidly than in cow's milk or other media, maturing in 10 to 10½ hours while other media require one-third to one-half longer time to reach the same degree of development.

"2. The number of organisms produced, as shown by the count per c.c., was also notably greater. Cultures grown under identical conditions for 16 hours showed a

	Count per c.c.
Soy milk	1,000,000
Cow's milk	600,000

"3. The individual bacteria were much larger and appeared to be much more vigorous than when grown in other media. Compared with milk cultures, the proportions were as follows:

	Cow's Milk	Soy Milk
Length	8.0 microns	16.0 microns
Width	0.8 "	1.0 "

Ercil Myers, Ph. D.

Bacteriologist"

4'4'8 8
4'4'8 16

	Sherman Units	International Units
Zo	B 24 units per ounce G 17 " " "	12 units per ounce
Fig Bran	B 5 " " " G 1 " " "	3 " " "
Fig Bran Flakes	A 3 " " " B 35 " " " G 16 " " "	5 " " " 17 " " "
Krusty Bran	B 4 " " " G 2 " " "	2 " " "
Vita Wheat	A 4 " " " B 42 " " " G 22 " " "	6 " " " 21 " " "
Cooked Whole Wheat	A 1 " " " B 12 " " " G 6 " " "	1 " " " 6 " " "
Rice Flakes	B 40 " " " G 16 " " "	20 " " "
Fatless Spread	A 92 " " " B 76 " " " C 2 " " " (Steenbock D 1 " " " G 53 " " "	129 " " " 38 " " " 20 " " " 3 " " "
Malted Nuts(present formula)	B 106 " " " G 32¾ " " "	53 " " "
Nuttose	G 28 " " "	
Protose	A 469 " " " G 14 " " "	657 " " "
Zwieback(large)	B 4 Slice (3/5 oz.) G 4 " "	2 " " "
Yeast powder(Food Company)	B 2520 units per ounce G 980 " " "	1260 " " "
Savita	B 1400 " " " G 700 " " "	710 " " "
Sal Savita	B 1120 " " " G 560 " " "	560 " " "
Whole Wheat Rusk	A 143 " " rusk	(Rusk 17.6 grams) 200 per rusk
Soy Gluten Wafer--per wafer	B 75 " " wafer G 12 " " " D 7 " " "	37 units per wafer 0 " " " 22 " " "

	Sherman Units	International Units
Soy Acidophilus Milk	A 100 units per ounce	140 units per ounce
	D 4 " " "	14 " " "
	E trace	Trace
Savita Vitamin Sauce (50 Sherman units per teaspoon)	B 286 units per ounce	143 units per ounce
	G 143 " " "	

FORMULA FOR DETASTING SOY BEANS

Detaste beans by adding soda and bringing to a boil. (One pound soda to 600 pounds beans.) Drain, wash beans thoroughly with cold water.

Are Eggs Wholesome.

Von Noorden, Wiczkowsky, Koester, and several other European investigators have been studying the effects of eggs upon intestinal putrefaction. Their verdict is that eggs, particularly the white of egg, when eaten in excess are capable of increasing intestinal putrefaction to a very marked degree. This is true even when the eggs are taken very fresh, and especially when hard cooked. When eggs are slightly stale the ill effects are greatly increased because of the germs which are already contained in the eggs, and which rapidly develop putrefaction if the eggs are taken into the stomach. The use of eggs, and particularly the white of egg, is found to be especially injurious in cases of Bright's disease. Eggs encourage the growth in the colon of germs of putrefaction, which have been proved to be the cause of membranous colitis and of appendicitis.

The Dietetic Value Of Fruits.

There are many popular but unfounded prejudices against the dietetic use of fruits. It is generally supposed, for example, that fruits are conducive to bowel disorders, and that they are especially prone to produce indigestion if taken at the last meal. The truth is the very opposite of these notions. An exclusive diet of fruit is one of the best-known remedies for chronic bowel disorders. During the late war, large numbers of soldiers suffering from chronic dysentery were in several instances rapidly cured when abundantly supplied with ripe peaches. Fruit juice may be advantageously used in both acute and chronic bowel disorders. Care must be taken, however, to avoid fruit juices which contain a large amont of cane sugar. Juices of sweet fruits should be employed,, or a mixture of sour and sweet fruit juices, or acid fruit juice may be sweetened with malt honey or meltose, a natural sweet produced from cereals. Raisins, figs, prunes, sweet apples, and pears may be mixed with sour fruits.

Indigestion sometimes results from the use of fruits in combination with a variety of other food substances; but fruits taken alone constitute the best possible menu for the last meal of the day. The combination of fruit, sugar, cream, bread, butter, cake, and pie may well produce bad dreams and a bad taste in the mouth in the morning. The use of fresh or stewed fruit alone without any addition whatever will produce no disturbance, and will leave no unpleasant effects behind to be regretted in the morning. Very acid fruits sometimes disagree with persons who have an excess of acid and those who are suffering from chronic inflammation of the stomach; but with these exceptions, there are almost no cases in which fruit may not be advantageously usedd

The notion that acid fruits must be avoided by rheumatics is another error which is based on inaccurate observations. The fact is, rheumatics are greatly benefited by the use of fruit. At the same time they should abstain from flesh foods of all sorts, beef tea and animal broths, and all meat preparations, also tea and coffee, as well as alcohol and tobacco. It is, of course,, possible for one to take an excess of acids, as one may take an excess of starch or any other food substances. Vegetable acids differ from mineral acids in the fact that they do not accumulate in the body, but are assimilated or utilized in the same way as sugar and allied substances.

Fruits have an advantage over all other foods in that they furnish to the system, in a completely digested form, ready for immediate assimilation, such material as is needed to re-enforce muscular energy. To this fact is due the refreshment which is so promptly afforded by fruit juices when one is tired, and the craving for juicy fruits under such circumstances. Most juicy fruits furnish not only water, but a small amount of digested food substance in the form of sugar, which is taken at once into the blood, and being carried to the muscles, replenishes the stores of energy which have been reduced by activity, and so brings refreshment and re-enforcement of vigor and strength.

Fruits also aid the digestion of other foods by promoting the formation of the gastric juice, and particularly the production of pepsin.

Another advantage afforded by the use of fruits is the fact that fruit acids readily destroy nearly all germs. Typhoid fever germs, cholera germs, and other germs likely to produce acute disease, are quickly killed by coming in contact with dilute solutions of citric and malic acids. Lemon or sour apple juice destroys germs

almost instantly. The juice of a lemon added to a glass of water may be relied upon to render the water sterile within half an hour, even though it may contain the germs of typhoid fever and cholera. This precaution may be advantageiosly taken by travelers, though, of course, it would be better to avoid all risk by using only boiled water when traveling. The antiseptic properties of fruit render it exceedingly valuable as a means of cleansing the stomach and the alimentary canal. The germs which grow in the stomach are quickly killed when placed in the pure juice of fresh fruit. This explains the beneficial effect of the grape cure, the apple cure, the peach cure, and various other fruit cures which have been for many years practised in Switzerland and other portions of Europe, and have more recently been employed in California, Ohio, and other States.

The writer has for a number of years made use of an exclusive fruit diet in the treatment of obesity, biliousness, and various forms of indigestion. In obesity, an exclusive fruit diet for three or four days causes a rapid loss of flesh without any considerable amount of discomfort. Fruit fills the stomach, and stays the craving for food, while furnishing very little nutritive material. Acid fruits are preferable to sweet fruits for this purpose. It is a good plan for a person who is too fat to make his diet consist largely of fruit, taking other food only at the midday meal. Persons suffering from chronic biliousness may pursue the same plan.

In fevers, fruits, especially in the form of fruit juices or fruit soups, are a most convenient food, and certainly the most appropriate of all foods. It is almost universally recognized as an established fact that beef tea and meat preparations of all sorts should be wholly withheld in cases of fever, as the patient is already suffering from the accumulation of waste matters to such a

degree that the addition of even the smallest amount contained in beef tea or a small piece of meat may be sufficient to give rise to an exacerbation of the disease and to lessen the patient's chances of recovery.

Persons suffering from acid dyspepsia must avoid sour fruits. Their stomachs are abnormal, and sensitive to acids. Organic acids, for some unknown reasons, are more irritating to these sore stomachs even than the acid of the gastric juice. Such persons may eat sweet prunes, pears, stewed raisins, baked bananas, and sometimes well-ripened peaches. They must avoid the more acid fruits.

Effects of Soda and Baking Powders.

In the experiments made on a dog by Pawlow, of St. Petersburg, with a Pawlow pouch, it was positively proved that soda and other alkaline salts prevent the formation of both gastric juice and pancreatic juice. Pawlow found that a pint of water introduced into the large stomach caused the flow of a considerable quantity of juice from the small stomach, the latter having a tube connected with it by which the secretion was led outward into a collecting pouch. It was noted, however, that when soda was added to the water, not a drop of gastric juice was produced. It was found also that prolonged use of soda produced a similar effect upon pancreas, thus destroying these secretions almost entirely.

Edkins, another investigator, showed that chlorid of sodium in proportion of six parts in one thousand, that is, a little more than half of one per cent, when placed in the stomach prevented the formation of free hydrochloric acid and pepsin. Water alone had the effect to produce a considerable amount of both pepsin and hydrochloric acid. The amount of chlorid of sodium used was about the same as that which a baker adds to a pound loaf of bread. It is thus apparent that sodium salts are extremely detrimental to digestion, and that their prolonged use may be the cause of hypopepsia or hypochlorhydria, or a weakening of the digestive organs to such a degree that they come to lose their normal function.

The free use of baking powders, as well as the free use of common salt, is unquestionably responsible to a large degree for the dyspepsia which has come to be almost universal at the present time. Simplicity is the first essential to safety. The addition of chemical substances of any sort to our natural foodstuffs is unwise and dangerous. The wise Being who created the digestive apparatus also knew how to make food-

stuffs exactly adapted to the needs of the body, and of the digestive apparatus whereby the body is supplied. The more closely we can keep ourselves in harmony with the natural order, the more certain we may be that we are standing upon a safe and sure foundation.

THE SUGAR CURE IN EPILEPSY

By

Stanislas Wladyczko

Professor of Neurology at the University of Wilno, Poland.

(Translated by the Editor from the French)

We know well that the normal quantity of sugar in the human blood is on the average one gram per liter of blood (according to Marcel Labbe, 0.90 to 1.10 grams per liter of blood). The lowering below 0.47 grams per liter (even below 0.7 grams per liter) under the influence, for example, of injections of insulin, will produce in man a hypoglycemic reaction which manifests itself by malaise, agitation and sweatings. In grave cases the malaise becomes intensified. The patients experience an exhausting heat. The sweating increases. In some cases vertigo is experienced and sometimes double vision, muscular trembling and occasionally true convulsions without involuntary micturition and defecation. Sometimes also mental confusion and even coma.

We know also that the hypoglycemic reaction in certain animals manifests itself by symptoms which resemble those seen in human beings.

By means of injections of insulin the sugar content of the blood of rabbits (which is normally .133 per cent) is lowered to .045 per cent. It is at this moment that the hypoglycemic reaction occurs. The respiratory movements are accelerated, the rabbit becomes uneasy, loses consciousness and lies upon its side with the head thrown back and if it is touched its feet make running movements. Finally convulsions occur and the animal passes into coma.

These paralytic and convulsive disturbances are not due to the insulin itself, but are due to the hypoglycemia produced by its influence. This is shown by the following experiment:

(1) If one injects a rabbit with a quantity of insulin sufficient to produce convulsions and at the same time if one introduces under the rabbit's skin two grams of glucose, hypoglycemia does not occur and consequently neither convulsions nor any other symptoms due to hypoglycemia will be seen.

(2) If after the employment of insulin alone we observe the beginning of the hypoglycemic reaction and if immediately after we inject four grams and a half of sugar the symptoms of this reaction disappear and the animal recovers his normal state.

Convulsions after the injection of insulin occur in other animals as well as in the rabbit as, for example, in mice and in dogs.

From the preceding facts it is clear that hypoglycemia may produce convulsions in man as well as in certain animals.

On the other hand, I have observed during the period of scarcity of sugar in certain countries in Russia that the number of cases of epilepsy increased, and in cases of patients who had suffered for a long time with epilepsy the attacks became more frequent. Besides, it was observed during this period that the tendency to muscular spasms increased in individuals who had been until that time free from muscular spasms from the moment they ceased to eat sugar.

In these cases I have been able to observe the coincidence of excessive muscular excitability with the diminished consumption of sugar, or rather with its total suppression, and, on the contrary, the return of the consumption of sugar diminished or attenuated certain symptoms while suppressing others.

It seems to us necessary to recall here the fact that many authors had before examined in epileptics the sugar content of the blood, but they have not obtained identical results. Some had observed hyperglycemia, others hypoglycemia, others still found the sugar content of the blood to be within normal limits.

But taking into consideration these results so widely different, we see that it was already a question of hypoglycemia in certain epileptics.

Retinger, professor of chemical physiology in the University of Wilno, observed in one of my epileptic patients a hypoglycemia very pronounced (about 50 per cent. of the normal) immediately before the convulsive crisis.

But if there are some cases of essential epilepsy in which disorders of glyco regulation occur, the chemical expression of which is hypoglycemia while the visible clinical expression is the epileptic crisis, it is impossible in the present state of our knowledge to determine the exact nature or location of the disorder.

It appears that in the normal state two opposing influences are at work. One tends to increase the sugar content of the blood, the other to decrease it. The first is due to the influence of the thyroid, the hypophysis and the suprarenal capsules, the latter to the pancreas.

But what, in fact, is the role played by each of these systems, by the glyco-regulating nerve centers, by the vago-sympathetic system, etc? This problem is complex. The solution of the question is not yet complete, hence I desire only to call attention to the fact that hyperglycemia more or less pronounced sometimes appears in certain cases of essential epilepsy and that hypoglycemia may in such persons provoke the course of epileptic seizures.

Consequently, in each particular case of essential epilepsy in which the attacks do not yield to ordinary anti-epileptic medication, we determine the

sugar content of the blood and determine the patient's tolerance for sugar by the glucose test. This test consists, as we know, of the ingestion while fasting of a certain quantity of glucose. With the same object, different authors have proposed various quantities of glucose. In our case we administered 1.75 grams of glucose per kilogram of body weight, dissolved in sufficient water to produce a 30 to 50 per cent. solution. Every thirty minutes, and in certain cases more frequently, the glycemia is determined during a period of two to three hours.

I have observed in my cases after such an examination some peculiarities. In a normal subject to whom the test is applied we see that the period of increase continues for an hour after the ingestion of sugar, while this period in an epileptic patient continues only about 20 minutes. In the study of the blood in these cases we found several different classes of cases:

(a) With normal glycemia. In such a case the sugar cure should not be employed.

(b) The test shows hypoglycemia.

(c) The test shows the glycemia to be normal or increased, but the tolerance test develops an active hyperglycemia. It is then to be well understood that in the third class of cases it is questionable whether the sugar treatment should be employed.

Glucose may be administered in four ways:

(1) By intravenous injection, injecting into the veins 100 to 1000 c.cm. of a 10 per cent. glucose solution. The glucose must be chemically pure and the solution sterile and warm. The solution should be injected very slowly.

(2) By means of clysters, or enemas, 1000 to 2000 c.cm. of a 5 per cent. glucose solution is introduced into the rectum.

(3) The glucose solution may be injected subcutaneously or into the

7-8-31

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The latest Battle Creek discovery is a delicious food beverage which induces sleep in a purely physiologic way. Says Sir Horace Plunkett, the famous Irish statesman, "Dormi puts me to sleep when nothing else will. It is wonderful."

A FAMOUS STATESMAN COULD NOT SEEEP

When Sir Horace Plunkett, at the age of 70 years, found himself the victim of an intractable insomnia, he at last found relief in aviation. Sir George Bernard Shaw said he was seeking "a pleasant mode of suicide." Sir Horace now uses DORMI. He says, "It puts me to sleep better than anything else. It is wonderful,etc."

SIR HORACE PLUNKETT

Is entitled to the gratitude of every rural community because he induced President Roosevelt to appoint the Country Life Commission. He is now living in retirement in London, and for years has suffered greatly from insomnia. Drugs failing to give him relief, he learned to fly as a last resort, and found that half an hour in the air at bed-time would enable him to sleep. Sir George Bernard Shaw accused him of "seeking a pleasant mode of suicide."

But aviation was a very inconvenient remedy. At the suggestion of a friend, he tried DORMI, and with such complete success that after several months' use, Sir Horace wrote, "Dormi is wonderful. It puts me to sleep better than flying or anything else. It is a most delicious beverage."

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IF YOU CANNOT SLEEP

USE THE NEW FOOD REMEDY

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Not a drug. A delicious food beverage. Sir Horace Plunkett, the famous Irish statesman, says, "DORMI puts me to sleep better than anything else. It is wonderful."

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DORMI

The latest Battle Creek dietary is a delicious food beverage which induces sleep in a purely physiological way. ~~It is not~~ Can Says Sir Horace Plunkett, the famous Irish statesman. "Dormi puts me to sleep when nothing else will. It is a wonderful."

A Famous Statesman Could not Sleep

When Sir Horace Plunkett, at the age of 77 years found himself the victim of an intractable insomnia he ~~learned aviation~~ at last found relief in aviation. Sir George Bernard Shaw ~~declared~~ said he was seeking "a pleasant mode of suicide." He found it upon ~~roomed~~ the rays. "It puts me to sleep better than anything else. It is wonderful" Ed

Sir Horace Plunkett

Every rural community in America ought to be entitled to the gratitude of every rural community because he induced President Roosevelt to appoint the County Life Commission

He is now living in retirement in London and for years has suffered greatly from insomnia. Drugs failed to give him relief. He ~~took to~~ learned to pay attention to the art of food, and found that half an hour at bedtime in the air would ~~put~~ enable him to sleep. Sir Bernard Shaw accused him of "sucking

a pleasant mode of
suicide"
But aviation was a
very inconvenient remedy.
After my experience of a
friend, ~~Sir Horace~~ he tried
DORMI and with
such complete recon-
that after general
anesthesia use Sir Horace

Wrote Connie is wonderful. It suits me better than ~~anyone~~ peppy or anything else. It is a most delicious beverage.

MEMO

Dirty Milk

When black particles can be seen at the bottom of the milk bottle, the milk is evidently very dirty and ought not to be used. Such milk is particularly dangerous for children. When dirt is present, germs are present also and the germs are of a dangerous character since they come from the colon of the cow. Such milk disagrees with young children, although older ones may become accustomed to it, so that the bad effects are less apparent, but even in such cases mischief is done by the autointoxication resulting from an overgrowth of putrefactive bacteria in the colon.

A good way to test milk for dirt is to strain it through a thin layer of absorbent cotton placed in a funnel. If dirt is visible upon the cotton after the bottle of milk has been poured through, the milk should be regarded as very much contaminated.

Clean Milk

Cow's milk always contains some germs which get into the milk while it is exposed during milking. Most of the germs fall into the milk-pail from the cow's body.

Another source of germs is the air of the stable in which germs are always floating, especially after feeding with hay, spreading the straw bedding, or

MEMO

currying the animals. Such work should be done after milking instead of just before, thus allowing time for the dust to settle.

Of course, animals must be kept clean by currying and washing. Care should be taken that the cloths used are reasonably clean.

It is highly important that a milk pail with a small opening should be used--the smaller the opening, the better. An opening 8 inches in diameter affords 4 times as good an opportunity for germs to fall into the pail as does an opening of 4 inches, and a 12 inch opening will permit 9 times as many germs to fall into the milk as will the smaller opening. By the use of the vacuum system of milking, germs may be still more perfectly excluded. The hands should be washed just before milking each cow, and constant care should be exercised to avoid raising dust during or just before milking.

More than 10,000 bacteria per cubic centimeter (a cubic centimeter is one-fourth of a fluid dram) will never be found in good milk. This is the maximum number found in certified milk. Much commercial milk contains as much as 200,000 bacteria. Such milk can not be considered wholesome and should be sterilized. Milk which contains colon germs, that is, B.coli, or Welch's bacillus, should be rejected as unfit for human consumption. This would require the rejection of a

MEMO

very considerable portion of the milk now being sold and eaten. The use of such milk is highly dangerous for young infants and is unwholesome for adults as well as for children.

MEMO

Milk Must Be Kept Cold

Keeping milk at a low temperature, that is, 40°F., or less, is necessary to prevent the growth of disease-producing germs. At this low temperature, the lactic acid-forming germs grow slowly, so that the milk will ultimately sour. But colon germs and other filth bacteria require a higher temperature. It is for this reason that milk left to stand in room temperature is apt to become unfit for use as food, especially by children. Such milk may become dangerous even before it sours, especially when used by young children. Milk kept at a temperature of 40° F. will remain in good condition for three or four days. If kept at 50° or 60° F., the milk should be used within 24 hours.

Where the Coffee Drinker Lives.- The United States is not only the world's greatest consumer of coffee, but actually imports more than a third of all that is raised. The government estimates that the average American drinks ten and one-half pounds, or perhaps 365 cups each year. In Canada, where tea is the favorite breakfast beverage, the individual allowance is only two pounds. Here are the figures for the number of pounds consumed by each coffee drinker in some of the other nations:

Netherlands	15	Belgium	10
Sweden	12½	Finland	9½
Denmark	12	Cuba	9
Norway	11		

p.1464, O'Shea's World Book, 1917.

By drinking two or three cups of strong black coffee at every meal muscular tremors sometimes are developed with "nervousness,"anxiety,dread of impending ill,with palpitation and feeling of precordial oppression,bradycardia,vertigoheartburn, dyspepsia,constipation,and insomnia. In such cases the symptoms usually promptly subside on suspending or restricting the beverage;but if they have been long continued,the use of sedatives may be necessary to control the ill effects. Extreme cases suggest the condition resulting from some drug habits,and there is irritability of the whole nervous system and mental excitement.

Practical Dietetics,Thompson,p.221

1905

Moderate Coffee Drinking.

The bitter principle in coffee is called caffeine, which is a drug, and it is the presence of this substance which produces effects both good and bad. Caffeine in small quantity (one to four grains) increases blood pressure and is a stimulant. It stimulates reasoning power temporarily, for it whips up the tired brain or muscles to do better work, and there is no depressing after-effect as with the use of other drugs. Therefore a cup or two of good coffee a day containing that amount of caffeine is declared not harmful to the average person. But medical authorities assert that more than that a day will many times cause sleeplessness and shaking hands, and will sometimes lead to more serious results, such as headache, palpitation of the heart and indigest on. So, with coffee drinking, as with everything else, the medical injunction is, "Be moderate."

"He knows to live who keeps the middle state,
And neither leans on this side nor on that."

p.1463, O'Shea's World Book, 1917.

Tea Poisoning.

Dr.W.N.Bullard,in a paper lately read before the Massachusetts medical society,gives a detailed analysis of the various symptoms of tea-poisoning,obtained from the study of a large series of cases. He arrives at the important conclusions,that the action of tea is cumulative,and is more pronounced on the young and those in a depressed physical condition,although persons otherwise healthy not infrequently show poisonous symptoms;that as a rule in the class of people examined by him,chiefly adult women,the average amount needed to cause poisonous symptoms was a little less than five cups daily;and that chronic tea-poisoning is a frequent affection,whose most common symptoms are loss of appetite,dyspepsia,palpitation,headache,vomiting and nausea,combined with nervousness,and hysterical and neuralgiac affections,frequently accompanied by constipation and pain in the region of the heart.

Science,April 16,1886,p.349.

DR. GRAD: In 1932 I began to read Dr. William Hay's book, "Health Via Food." Have you read that book? You have heard of Dr. Hay, William Hay of Buffalo?

DR. KELLOGG: Yes. He got his inspiration from Dr. Tilden in Colorado.

DR. GRAD: I read his book and that gave me a little insight into the mode of living, and I followed that regime for about a year or so. I separated the starches from the protein. That was his great point. Then I went to a sanitarium in East Aurora, but when I got there I had already lost about 44 pounds in weight. I weighed 164 and dropped to 120.

DR. KELLOGG: Was it simply change of diet or lessening the amount of food you took?

DR. GRAD: Both, but it was change of diet to a very large extent.

DR. KELLOGG: May I ask you one more question about the diet? Just what was your regime when you lived on a Hay diet as you call it?

DR. GRAD: When I ate meat or fish I would not eat starches, bread or potatoes, but I ate everything else. If I had potatoes and bread I would not eat any meat, but I would eat everything else. I did not use sugar.

DR. KELLOGG: It was carbohydrate you discarded when you ate meat?

DR. GRAD: Yes, sir; but not exactly. I would eat a little piece of pie for my dessert.

DR. KELLOGG: Dr. Tilden's idea was that if he proscribed starch and meat, the mixture of the two together, or carbohydrates and meat, the people would soon get so tired of the meat that they would not eat it and would drop meat from the diet. His assistant told me that was simply their method of getting rid of meat.

DR. GRAD: That was the object to get rid of meat? I ate very little meat. My change in my diet came when I went to East Aurora. I went to the Sun Diet Sanitarium and stayed there a week or so. That was Hay's place where Hay did his work. Then he got into a fight with them and he left them. When we got there he was not there any more. While I was at East Aurora I met Dr. Jackson from Toronto. Do you know him?

DR. KELLOGG: Yes, I know of him.

DR. GRAD: Then I read his book on how to be always well.

DR. KELLOGG: What are the essential points? I have never read his book.

DR. GRAD: He has a very large and a very interesting book. I learned from that book about raw food, and then I made a complete change of my own. I left out all meats and I ate as much raw things as I could, salads and fruit and nuts, and that was the great change. That was in 1934.

DR. KELLOGG: Have you read any books by Sherman or McCollum?

DR. GRAD: I heard McCollum lecture once in the Academy of Medicine in New York and I got some points from him. In 1934 I began with this complete change in the diet and then began to exercise, too.

DR. FISHER: In your change in diet you excluded all flesh food and all animal foods except cheese, butter and honey?

DR. GRAD: I discarded milk also. No milk except cheese. Milk used to distress me very much. Now, the great benefit I derived--

DR. FISHER: Wait a minute. Describe your diet as it is now-- the amounts of your food.

DR. GRAD: Now I eat this way: I have no breakfast. I have not had breakfast for many years. Our lunch hour is about eleven or twelve o'clock and it consists of raw fruit, usually bananas, oranges, prunes-- not cooked prunes, but just raw prunes-- and occasionally some nuts, grapefruit and apples, and with that I eat a little cheese, cottage cheese usually, and then I have two pieces of whole wheat bread.

DR. KELLOGG: Is cottage cheese the only kind of cheese you use?

DR. GRAD: I sometimes eat Philadelphia cream cheese, but I eat American cheese only once in a great while. I do not eat anything that has white sugar in it or white flour. My evening meal consists of a salad consisting of hearts of lettuce, tomatoes, radishes, green pepper, endive, cucumbers with the skin on, and

one of two cooked vegetables. I always eat at least two raw carrots a day and I eat an apple or two apples a day and an orange a day and I also have juices like lemon juice or pineapple juice or grapefruit juice or grape juice. I drink some of those juices.

DR. KELLOGG: Orange juice?

DR. GRAD: I like to eat my orange rather than to drink the juice. I like to eat the pulp.

DR. KELLOGG: Grapefruit you use freely?

DR. GRAD: Yes, I like grapefruit, too. I like any fruit, but it is raw fruit. My prunes are raw and I also eat raw apricots, dried apricots soaked in hot water for 12 hours. That is my whole diet every day and I never tire of it.

DR. KELLOGG: When one has the proper diet he does not need so very much change.

DR. GRAD: I am never fatigued and I sleep wonderfully.

My exercises consist now in running at least 5 miles every morning. When I get up early in the morning we do exercises of about 1,100 motions.

DR. KELLOGG: What rate do you run?

DR. GRAD: I make a mile in 13 minutes.

DR. KELLOGG: Now about my colon. I used to have to take medicine. I used to take Epsom salts about twice a week for years and years. Then I gave up all Epsom salts and I depended entirely on enemas. In 1935, I think this was, it took me nearly a whole year to get my colon in

good shape. I used to take as many as three or four enemas a day in order to get proper elimination.

DR. KELLOGG: That was during that first year?

DR. GRAD: Yes. Since then I have been in very good shape.

DR. KELLOGG: Do you think the enemas did you any harm?

DR. GRAD: They never did me any harm. My colon action is perfectly all right.

DR. KELLOGG: Why did you take three or four a day?

DR. GRAD: Because I did not take any medicine. I was distressed. For instance, I would take an enema before I went to the operating room.

DR. KELLOGG: Was it gas in your colon?

DR. GRAD: Yes, and I wanted elimination. Then if I would come home for lunch and my bowels did not move, I would take another enema and one before I went to bed. Whenever I had the least sign of a headache I would take an enema. At first I used the juice of a lemon in the water. I gave that up. That was recommended by Hay.

DR. KELLOGG: I have been using that for 40 years. My wife suffered terribly from constipation. She had a bad colitis and I found that medicines were making her worse all the while and I prescribed lemon juice, and I have for great numbers of patients. It served so perfectly

its purpose that I have continued it for 40 years or more.

DR. GRAD: I continued it for a little while and then gave it up. If I overeat or something like that and do not feel comfortable in my colon, I take an enema and just use plain water.

DR. KELLOGG: A glassful of sour milk will answer the same purpose.

DR. GRAD: Soybean milk or acidophilus milk, too?

DR. KELLOGG: Yes, I make great use of soy acidophilus since I have had such success myself. I use it by enema, and that is how I cured up the colitis so quickly.

DR. GRAD: About my skin. I used to have a skin that was always cold. I used to wear very heavy underwear. Then I trained myself to take cold showers. When I was in Paris one time we asked the salesman to give us tres chaud underwear. Even in the summer time I used to wear the heaviest underwear. Then I began to use cold showers and now I get into a cold tub of water in the morning and I lie there quietly until I count 300. When I come out my skin is almost pink, and then I take a cold shower. That brought my skin back wonderfully. I never wear any underwear and my skin is always warm.

I used to suffer with hay fever. I used to get injections for the pollens and grasses. I was very allergic to timothy and goldenrod, and now I can sleep with it and it does not affect me. One thing I am

allergic to and that is pepper and ginger.

DR. KELLOGG: It is a good thing, isn't it?

DR. GRAD: Last December I got a box of figs from California, a present, and they were steeped in crystalized ginger. I had three or four of them and 24 hours later I was down with a terrible attack, so much so, Doctor, that I had even hematuria from it. It took nearly two months for the albumen to clear up.

DR. KELLOGG: From the extravasation.

DR. GRAD: I am allergic to pepper. I did not know about it until one day I had an experience like this: My sister-in-law gave me a salad and she put a lot of dressing on it consisting of pepper-- it is a Russian dressing-- and the next day I was driving my automobile and I was taken with a severe attack of frequency of urination to such an extent that I had to stop and lie down on the side of the road for nearly three hours until this thing passed over. I found that every time I take any pepper at all it will do the same thing. I had to have a hypodermic for the first time in my life. Why should I be so allergic to those two things?

My endurance is remarkable. While I was doing surgery I could be in the operating room six hours on a stretch and be just as spry when I walked out as when I came in. I can be up eighteen hours of the day and never feel fatigued, but I get sleepy, of course. Before that I had no endurance. I used to come home after an operation very tired and had to sleep and sleep and sleep. I used

to be busy in the office and I used to tell my nurse, "You just wait with that patient." I would put my feet up in the air and get two minutes' sleep to refresh me. One day I was driving my car and fell asleep at the wheel and nearly killed my nurse, I was so fatigued.

Before I began my exercises I had to go somewhere in a hurry. I saw a car about half a block away and I ran after that car. When I got in there I thought I would die right there and then. My heart simply went to pieces.

DR. KELLOGG: Did you know Dr. Herter of New York.

DR. GRAD: No:

DR. KELLOGG: He was a professor at Columbia. He distilled the indol and skatol of fecal matter and sent it up to Dr. Lee, Professor of Physiology of Columbia. He was experimenting at that time on fatigue. He devised a delicate apparatus for detecting fatigue. He tested indol and skatol and found they were powerful fatigue poisons. An animal put under their influence was exhausted right away.

DR. GRAD: Histamine did the same thing.

DR. KELLOGG: Did not know histamine at that time. Yes, histamine will do the same thing. It is a strong poison. An authority stated recently that in the average colon there was enough histamine to kill a regiment of men.

DR. FISHER: If it were injected into the blood?

DR. KELLOGG: Yes, if it were all given at one time.

DR. FISHER: Not by mouth?

DR. KELLOGG: Injected, of course.

DR. GRAD: They also think that uremic convulsions are due to histamine, and also during pregnancy those toxemias of pregnancy depend on it. How true it is I do not know.

DR. KELLOGG: If you can suppress putrefaction in the colon you get rid of it.

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(Index Rerum)

RIPENING CANDY

Candy filling may be kept soft for months inside its chocolate coating by a process discovered by H. S. Paine and J. Hamilton, of the U.S.Bureau of Chemistry. They have found that the addition of invertase extract makes unnecessary the ripening process which causes delays in candy manufacture.

Invertase is an enzyme found in nature that has the power of changing cane sugar back to simple sugar like dextrose. While fondant seems to be a solid it is really composed of microscopic bits of sugar held together by a film of syrup. It is about the consistency of putty and has a number of its physical characteristics. When fondant is stretched out it looks dry and stiff. When it is worked together between the fingers it becomes oily and moist.

The action of the invertase dissolves a number of the sugar crystals making the syrup film constant around them. This assures the creamy center which is so much to be desired.

Cream of tartar added to the candy would give the same creamy filling but the addition of the acid spoils the taste, and does not do away with the process of ripening, how ever, as invertase does.

According to the old rule for fondant, handed down from master to apprentice, fondant had to be cooked slowly, allowed to cool thoroughly, beaten with a wooden paddle. Then it was put into stone jars and allowed to ripen for several days. After this it was taken out, melted and poured into starch molds. It was allowed to ripen in the molds for several days before it was dipped into chocolate. The chocolate coating acts as a protection against drying. Inside this air proof case inversion takes place to a slight degree, that is, the sugar particles dissolve somewhat in the syrup.

By the addition of invertase when the flavoring is added the ripening process is not necessary. The fondant is cooked, beaten with a wooden paddle, remelted, poured into molds, and dipped in chocolate all in the same day. Chocolates treated in this way have been tested after six months and 6.8 per cent. of water has been found present in the fondant.

--Science-Supplement, Nov. 12, 1924.

WATER-CRESS

"According to Xenophon, the ancient Persians lived much upon water-cresses, which they considered the most wholesome of all vegetable productions. When boiled, they lose their aromatic properties."

Sinclair's Code of Health and Longevity.

"Spinach as a source of iron is exceeded by beet tops, ...parsley, turnip tops and water-cress.

Sherman, in Food Products, p.368.

"Watercress resembles cabbage, lettuce and other leafy vegetables in its high content of vitamin C. Coward and Eggleston (1928) reported that 1 gram daily of fresh watercress is sufficient to protect a guinea pig completely for a period of 70 days."-Sherman and Smith, in The Vitamins.

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FOODS PECULIAR TO THE ORIENT.

Artichokes.

Many different kinds of beans, lentils, and peas.

Peculiar lemons looking like a large pear, just one in pot. These are raised on the Island of Sicily from by covering the whole on live coals. Very nice.

Grape leaves for stuffing.

Pistachio and many other nuts.

Turkish hazel nuts, peanuts and walnuts.

Excellent slightly acid fruit called vangola, in Italy.

Kumquats in syrup.

Fruit of Malta in Athens

Mulberries.

Eggplants.

Squashes of many different kinds.

Salted ripe olives

Soft curd cheese and which cheese. Dried curds, in hard dry balls.

Halvah.

Salted tomato pulp; keeps six months; put up in large kegs.

Egyptian dates, shell, dried, rather tasteless.

Large red Egyptian dates.

Tunis, or algerian dates, smaller, no stones, in boxes; chewed ugly sweet, soft, fine, clean.

Egyptian dates 2 to 4 ¢ per lb. ¢ duty off.

Tunis dates 8 to 10¢ per lb. ¢ duty off.

Figs, dried,, in boxes or bags, 4 to 6 ¢ per lb.

Figs in little sacks, 5¢ per lb. Very good and sweet.

Walnuts, hazelnuts, 6 ¢ per lb.

Almonds, in shells, 7 ¢

Okra, green, dried, also on strings

Tools check.

Bread. Thinly round and flat; raised brown, very sour, mostly made of coarse meal. Also thin unleavened cakes. Unleavened bread is baked on stones in time,, the other above on the tin with a fire of dry cowdung underneath.

Bread made in round rings, covered with sesamine seeds.

greentables, plum, nuts, cheese.

DRINK.

Most universal drink liquorice water.

Lemonade.

Honey water.

Many different kinds of syrups.

Cultivated grape juice sometimes still found in the country, according to Mr. Floyd, more common, however r, to make sweet wine from raisins.

Watermelons and muskmelons

geesemeats.

Salad Rattop in big square cans like kerosene oil cans, transported from over in Egypt. Dough well then sealed up.

Hot plum.

Thin tinef of sweet paste, same as those seen in Mexico.

Round bombons made by chefing together in big bowls, suspended by rope.

Lentil cakes, cooked in grease like doughnuts.

Herbal Simples.

The following extracts are from "Herbal Simples", by Fernie:

Acorn.

The earliest inhabitants of Greece and Southern Europe who lived in the primeval forests were supported almost wholly on the fruit of the Oak. They were described by classic authors as fat of person,and were called "balanophagi"-acorn eaters.

The Acorn contains chemically starch,a fixed oil,citric acid,uncrystallizable sugar,and another special sugar called "quercit."

Acorns,when roasted and powdered,have been sometimes employed as a fair substitute for coffee. By distillation they will yield an ardent spirit.

Almonds.

Two sorts of almonds are available with us commercially-the sweet,or Jordan almond,-so called,it would seem,from jardyne,"because being of the garden sort (chiefly from Malaga, and not in any way connected with the sacred river of Syria); and the bitter almond,belonging to the same species,but possessing other poisonous properties which are dangerous.

Apple.

A poultice made of rotten Apples is commonly used in Lincolnshire for the cure of weak,or rheumatic eyes. Likewise, in the Hotel des Invalides,at Paris,an Apple poultice is employed for inflamed eyes,the Apple being roasted,and its pulp applied over the eyes without any intervening substance. To obviate constipation,two or three Apples taken at night,whether baked or raw,are admirably efficient. It was said long ago: 'They do easily and speedily pass through the belly,therefore they do mollify the belly,'and for this reason a modern maxim teaches that:-

'To eat an Apple going to bed
Will make the doctor beg his bread.'

As varieties of the Apple,mention is made in documents of

the Apple,mention is made in documents of the twelfth century,of the pearmain,and the costard,from the latter of which has come the word costermonger,as at first a dealer in this fruit, and now applied to our costermonger. Caracholo,an Italian writer, declared that the only ripe fruit he met with in Britain was a baked apple.

About the year 1562 a certain rector of St.Ives,in Cornwall, the Rev.Mr.Attwall,practised physic with milk and Apples so successfully in many diseases,and so spread his reputation,that numerous sufferers came to him from all the neighboring counties.

Dr.Prior says the word Apple took its origin from the Sanskrite, Ap.,- "water",and P'hal,-"fruit,"meaning "water fruit,"or "juice fruit";and with this the Latin name Pomum-from Poto,"to drink"-precisely agrees;if which be so,our apple must have come originally from the East long ages back.

Asparagus

The Asparagus first came into use as a food about 200 B.C., in the time of the elder Cato,and Augustus was very partial to it. The wild Asparagus was called Lybicum,and by the Athenians,Horminium. Roman cooks used to dry the shoots,and when required,these were thrown into hot water and boiled for a few minutes to make them look fresh and green.

Cabbage

The Cabbage,which is fabled to have sprung from the Spartan lawgiver,Lycurgus,began as the Colewort,and was for six hundred years,according to Pliny and Cato,the only internal remedy used by the Romans. The Ionians had such a veneration for Cabbages that they swore by them,just as the Egyptians did by the onion. With ourselves,the wild Cabbage,growing on our English sea cliffs, is the true Collet,or Colewort,from which have sprung all our varieties of Cabbage-cauliflower,greens,broccoli,etc.
No vegetables were grown for the table before the time of Henry the Eighth. In the thirteenth century it was the custom to salt vegetables because they were so scarce;and in the sixteenth century a Cabbage from Holland was deemed a choice present.

In 1595 the sum of twenty shillings was paid for six Cabbages and a few carrots,at the port of Hull,by the purveyor to the Clifford family.

Sir Anthony Ashley brought the Babbage into English cultivation. It is said a Cabbage is scultured at this feet on his monument in Winbourne Minster,Dorset. He imported the Cabbage (Cale) from Cadiz (Cales),where he held a command,and grew rich by seizing other men's possessions,notably by appropriating some jewels entrusted to his care,by a lady. Hence he is said to have got more by Cales (Cadix) than by Cale (Cabbage);and this is,perhaps,the origin of our term "to cabbage."

The Cabbage was Pompey's bed-beloved dish.

Some half a century ago medical apprentices were taught the art of blood-letting by practising with a lancet on the prominent veins of a Cabbage leaf.

Carrots

The chief virtues of Carrots lie in the strong antiseptic qualities which they possess,which prevent all putrescent changes within the body.

Carrots boiled sufficiently and mashed into a pulp,when appl applied directly to a putrid indolent sore,will sweeten and heal it. The Carrot poultice was first used by Salzer for mitigating the pain and correcting the stench of foul ulcers. Raw scraped Carrot is an excellent plaster for chapped nipples. At Vichy where derangement of the liver and of the biliary digestion are particularly treated,Carrots in one or another form are served at every meal,whether in soup,or as a vegetable;and considerable efficacy of cure is attributed to them.

Before the French Revolution the sale of Carrots and oranges was prohibited in the Dutch markets,because of the unpopular aristocratic colour of these commodities.

Cherry

According to Pliny,Cherries were first brought to Rome by Lucullus after his great victory over Mithridates,89 B.C. The cultivated Cherry disappeared in this country during the Saxon period, and was not re-introduced until the reign of Henry the Eighth.

Cherry stones have been found in the primitive lake dwellings of Western Switzerland. There is a tradition that Christ gave a Cherry to St.Peters,admonishing him not to despise little things.

In France soup made from Cherries and taken with bread, is the common sustenance of the wood-cutters and charcoal-burners of the forest during the winter.

Currants

The bushes which produce this fruit grow wild in the northern parts of Great Britain,and belong to the Saxifrage order of plants. The wild red Currant bears small berries,which are intensely acid. In modern Italy basketfuls are gathered in the woods of the Apennines,and the Alps.

Date

The Date palm is remarkably fond of water,and will not thrive unless growing near it,so that the Arabs say: "In order to flourish, ita feet must be in water,and its head in the fire (of a hot sun)." Travellers across the desert,when seeing Date palms on the horizon, know that wells of water will be found near at hand: at the same time they can sustain themselves with Date jam.

Strutt mentioneda grocer's beill delivered in 1581,in which occurs the item of six pounds of dates supplied at a funeral for two shillings;and we read that in 1821 the best kind of dates cost five shillings a pound.

The Arabs say that Adam when driven out of Paradise took with him three things-the Date,chief of all fruits,the Mrytle,and an ear of Wheat.

Figs

Thr first Fig trees introduced into England are still alive and productive in the gardens of the Archbishop of Canterbury,at Lambeth,having been planted there by Cardinal Pole in the time of Henry the Eighth. We call the Sunday before Easter "Fig Sunday," probably because of our Saviour's quest of the fruit when going from Bethany the next day.

Onion

The Egyptians were devoted to Onions,which they ate more than two thousand years before the time of Christ. They were given to swear by the Onion and Garlic in their gardens. Herodotus tekks us that during the building of the Pyramids nine tons of gold were spent in buying Onions for the workmen. But it is to be noted that in Egypt the Onion is sweet and soft,whereas in other countries it grows hard, and nauseous and strong.

Leek

The Scotch Leek is more hardy and pungent than that grown in England. It was formerly a favourite ingredient in the Cock-a-Leekie soup of Caledonia,which is so graphically described by Sir Walter Scott, in the Fortunes of Nigel.

A "Herby" pie,peculiar to Cornwall,is made of Leeks and pilchards, or of nettles,pepper cress,parsley,mustard,and spinach,with thin slices of pork. At the bottom of the Squab pie is a Squab,or young Cormorant, "which diffuses,"says Charles Kingsley,"through the pie,and through the ambient air,a delicate odour of mingled guano and polecat."

Grapes

What is known as the Grape Cure is pursued in the Tyrol,in Bavaria,on the banks of the Rhine,and elsewhere-the sick person being ordered to eat from three to six pounds of Grapes a day. But the relative proportions of the sugar and acids in the various kinds of [illegible]pes have important [illegible]al bearings on the results obt[illegible]me purgation shall follow,or whether tonic and [illegible]s shall be produced. In the former case,sufferers from sluggish liver and torpid biliary functions,with passive local congestions,will benefit most by taking the Grapes not fully ripe,and not completely sweet; whilst in the latter instance,those invalids will gain special help from ripe and sweet Grapes who require quick supplies of animal heat and support to resist rapid waste of tissue,as in chronic catarrh of the lungs or mucous catarrh of the bowels.

Children do not,as a rule,bear the Grape Cure well. One sort of Grape,the Bourdelas,or Verjus,being intensely sour when green, is never allowed to ripen,but its large berries are made to yield their acid liquor for use instead of vinegar or lemon juice,in sauces,drinks,and medicinal preparations.

Muscatels are known as "raisins of the sun,"because left upon the tree to dry in the sunshine before being gathered. Grapes can be better cured and dried,because of local conditions,in certain parts of Spain than elsewhere,especially near Malaga. The Valentia, or pudding raisins,are likewise imported fromSpain. Sultanas,which are destitute of stones or seeds,are received from Smyrna. "Surpassing even the banana in nutritive value" (Dr.Hutchison) "is the group of dried fruits which includes the raisin and the date." Raisin-tea is found to be of the same proteid value as milk,and much more easily digested,therefore of superior use in many cases of gastric disease where milk or soups (vegetable or animal)must be disallowed. "Take half a pound of good raisins,and wash them well in cold water. Cut them up roughly to free the pulp in cooking,and put them into a stewing jar with one quart of cold water. Cook for from three to four hours,when the liquid will be reduced to one pint. Press all but the insoluble skins and stones through a find scalded sieve,and use the tea either hot or cold;if too sweet a little lemon juice may be added."

In Portugal,Grape juice is boiled down with quinces into a sort of jam-the progenitor of all marmalades.

The original Grape vine is supposed to have been indigenous to the shores of the Caspian Sea.

Honey

The name Honey has been derived from a Hebrew word ghoneg, which means literally "delight". Historically, this substance dates from the oldest times of the known world. We read in the book of Joshua that the land of Canaan, where Abraham dwelt, was flowing with milk and honey; and in the Mosaic law were statutes regulating the ownership of bees.

Among the ancients, Honey was used for embalming the dead; and it is still found contained in their preserved coffins.

Aristaeus, a pupil of Chiron, first gathered Honey from the comb, and it was the basis of the seasoning of Apicius; whilst Pythagoras, who lived to be ninety, took latterly only bread and Honey.

Aged persons who are toothless may be supported almost exclusively on sugar. The great Duke of Beaufort, whose teeth were white and sound at seventy, whilst his general health was likewise excellent, had for forty years before his death a pound of sugar daily in his wine, chocolate, and sweetmeats. A relish for sugar lessens the inclination for alcohol, and seldom accompanies the love of strong drink.

Queen Elizabeth was particularly fond of Mead, and had it made every year according to a special recipe of her own, which included the leaves of sweet briar, with rosemary, cloves, and mace.

Lemon

The Chinese practice of rubbing parts severely neuralgiac with the wet surface of a cut Lemon is highly useful. This fruit has been sold within present recollection at half-a-crown each,and during the American War at five shillings.

The hands may be made white,soft,and supple by daily sponging them with fresh Lemon juice,which further keeps the nails in good order;and the same may be usefully applied to the roots of the hair for removing dandriff from the scalp.

Lentil

Jacob's mess of pottage which he sold to Esau for his birthright was a preparation of the red Lentil;and the same food was the bread of Ezekiel.

The Romans etc. p. 282

Lettuce

The Romans,in the reign of Domitian,had the Lettuce prepared with eggs,and served with the last course at their tables,so as to stimulate their appetites afresh.

No attempt was made to cultivate the Lettuce in this country until the fourth year of Elizabeth's reign.

"Galen (whose beloved sallet it was) says it breeds the most laudable blood. No marvel,then,that Lettuces were by the ancients called sanoe by way of eminency,and were so highly valued by the great Augustus that,attributing to them his recovery from a dangerous sickness,it is reported he erected a statue and built an altar to this noble plant."

Cinnamon

For many years past Cinnamon has been successfully employed as a specific abortive of the influenza poison,only provided its free use is commenced medicinally within a time-limit of twenty-four hours after the first accedd of an attack;otherwise the toxication of the whole system hasadvanced beyond the power of this remedy for scotching the parent virus of the invading disease. "For this purpose," says Dr.J.C.Ross,of Manchester,"five drops of the true oil of Cinnamon with a tablespoonful of water,every hour or two,for six or eight doses,will promptly and effectually exterminate the enemy."

Oat

Scottish people actually revel in their parritch and bannocks. "We defy your wheaten bread,"says one of their favourite writers, "your home-made bread,your bakers' bread,your baps,rolls,scones, muffins,crumpets,and cookies,your Bath buns,and your Sally luns,your tea cakes and slim cakes,your saffron cakes,and girdle cakes,your shortbread,and singing hinnies:we swear by the Oat cake,and the parritch,the bannock,and the brose." Scottish beef brose is made by bo boiling Oatmeal in meat liquor;and kail brose by cooking Oatmeal in cabbage water.

In the border forays of the e twelfth and thirteenth centuries, all the provision carried by the Scots was simply a bag of Oatmeal.

Orange

This fruit is essentially a product of cultivation extending over many years. It began in Hindustan as a small bitter berry with seeds; then about the eighth century it bore imported into Persia, though held somewhat accursed. During the tenth century it bore the name "Bigarade," and became better known. But not until the sixteenth century was it freely grown by the Spaniards and brought into Mexico. Even at that time the legend still prevailed that whoever partook of the luscious juice was compelled to embrace the faith of the prophet.

Pea and Bean

Because of the seed's close resemblance to the kidney, as well as to the male testis, the Egyptians make it an object of sacred worship, and would not partake of it as food. They feared lest by so doing they should eat what was human remaining after death in the Bean, or should consume a soul. The Romans celebrated feasts (Lemuria) in honour of their departed, when Beans were cast into the fire on the altar; and the people threw black Beans on the graves of the deceased, because the smell was thought disagreeable to any hostile Manes. In Italy, at the present day it is customary to eat Beans, and to distribute them among the poor, on the anniversary of a death. Because of its decided tendency to cause sleepiness, the Jewish High Priest was forbidden to partake of Beans on the Day of the Atonement and there is now a common saying in Leicestershire that for bad dreams, or to be driven crazy, one has only to sleep all night in a Bean field. The philosopher, Pythagoras, warned his pupils against eating Beans, the black spot thereon being typical of death.

"This Potato,the Solanum tuberosum,is so universally know as a plant that it needs no particular description. It is a native of Peru,and was imported in 1856 by Thomas Heriot,mathematician and colonist,being afterwards taken to Ireland from Virginia by Sir Walter Raleigh,and passing from thence over into Lancashire. He knew so little of its use that he tried to eat the fruit,or poisonous berries,of the plant. These of course proved noxious, and he ordered the new comers to be rooted out. The gardener obeyed,and in doing so first learnedthe value of their underground wholesome tubers. But not until the middle of the eighteenth century,were they common in this country as an edible vegetable.

"For a considerable while after their introduction,the Potato tubers were grown only by men of fortune,as a delicacy;and the general cultivation of this vegetable was strongly opposed by the public,chiefly by the Puritans,because no mention of it could be found in the Bible.

Also in France great opposition was offered to the recognized use of Potatoes;and it is said that Louis the Fifteenth,in order to bring the plant into favour,wore a bunch of its flowers in the button-hole of his coat on a high festival. Later on,during the Revolution,quite a mania prevailed for Potatoes. Crowds perambulated the streets of Paris,shouting for "La liberté,et des Batatas", and when Louis the Sixteenth had been dethroned,the gardens of the Tuileries were planted with Potatoes. Cobbett,in this country,exclaimed virulently against the tuber as "hogs' food,"and hated it as fiercely as he hated tea. The stalks,leaves,and green berries

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of the plant share the narcotic and poisonous attributes of the nightshades to which it belongs;and the part which we eat,though often thought to be a root,is really only an underground stem, which has not been acted upon by light so as to develop any poisonous tendencies,and in which starch is stored up for the future use of the plant.

"Chemically the Potato contains citric acid,like that of the lemon,which is admirable against acurvy;also potash,which is equally antiscorbutic,and phosphoric acid,yielding phosphorus in a quantity less only than that afforded by the apple and by wheat. It is of the first importanwe that the potash salts should be retained by the Potato during cooking:and the tubers should therefore be steamed with their coats on;else if peeled and then steamed, they lose respectively seven and five per cent of potash and phosphoric acid.

"The carriage of a small raw Potato in the trousers' pocket has been often found preventive of rheumatism in a person predisposed thereto,probably by reason of the sulphur and the narcotic principles contained in the peel. Ladies in former times had their dresses supplied with special bags or pockets in which to carry one or more small raw Potatoes about their persons for avoiding rheumatism.

Radish

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Spinach

"Spinach is richer in iron than the yolk of the egg,which contains more than beef. Its juice,produced in cooking the leaves without adding any water,is a wholesome drink,and improves the complexion.

Strawberry

Properly,our familiar Strawberry plant is a native of cold climates,and so hardy that it bears fruit freely in Lapland. When mixed with reindeer cream,and dried in the form of a sausage,this fruit constitutes the plum-pudding of the Polar regions.

"Virgil ranked it with sweet -smelling flowers;Ovid gave it a tender epithet;Pliny mentions the Strawberry as one of the native fruits of Italy;Linnaeus declared he kept himself free from gout by eating plentifully of the fruit;and Hoffmann says he has known consumption cured by the same means.

"Dr.Boteler is reported (Walton's Complete Angler)to have said, "Doubtless,God Almighty could have made a better berry,but He never did."

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ABSORBABILITY OF DIFFERENT FOODS.

	Dry Substance	Per cent absorbed. Proteid	Fat	Carbohy
Meats and fish	95	all	79 to 92	...
Eggs	95	"	96	...
Milk	91	"	93 to 98	?
Butter	...	"	98	...
Margarine	...	"	96	...
Fine wheat bread	95-1/2	"	?	99
Decorticated whole wheat bread	88	"	?	92 1/2
Maize meal	93	"	?	97
Macaroni	95	"	?	97 1/2
Rice	96	"	?	99
Peas	99	"	?	96 1/2
Beans	82	"	...	?
French beans	85	"	...	...
Potato puree (in small quantities)	...	"	...	Practically all
Potatoes in general	80-1/2	"	...	92 1/2
Cabbage	85	"	...	84 1/2
Carrots	79	"	...	82
Beetroots	...	"	?	82

Fat	Melting-Point	Percentage unabsorbed.
Butter	37° C.	2-1/2
Bacon	48° C.	8
Mutton-fat	52° C.	10

	Proteid	Fat	Carbohydrates.
Animal foods	98 %	97 %	100 %
Cereals and sugars	85 %	90 %	98 %
Vegetables and fruits	80 %	90 %	95 %

F O O D R E M E D I E S .

- **Fats**
  - Animal
    - Tallow--suet
    - Lard
    - Butter--cream
      - Non-emulsified
      - Emulsified
  - Vegetable
    - Olive oil
    - Sesame oil
    - Cocoanut oil
    - Nut oils
    - Cacao butter
    - Nuts
    - Nut butters
      - peanuts
      - pecans
      - almonds
    - Nut creams
- **Proteins**
  - Animal
  - Vegetable
    - Use and abuse
- **Maltose**
- **Carbohydrates**
  - anti-toxic
  - raw foods

Combine cacao and cocoanut -- San kitchen

Try peas, gluten, cocoanut and rice.

Have some gluten baking powder made.

Write Chappel about baking powder.

Eat dry rice flakes or toast as beginning of meal.

Make a rule

Bran biscuit with malt honey

Prepare some biscuit with cascara--dram to each colax biscuit.

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Cabbage	85	"	...	92-1/2
Carrots	79	"	...	84-1/2
Beetroots	...	"	?	82.

Absorbability.

Proteids,--animal and vegetable. Loss is as follows:--

Carrots	40	per cent
Potatoes	30	"
Beets	17	"
Rice	20	"
Milk	7	"
Beef	2.6	"
Eggs	2.6	"

Reason for greater loss is vegetable proteids

Absorption of Fat.

The lower the melting point, the better the absorption.

Butter melts at 100°, loss 2-1/2 per cent.

Bacon melts at 118°, loss 8 per cent.

Mutton melts at 126°, loss 10 per cent.

COOKING SCHOOL.

1. Dainty and digestible desserts.
2. Relishable and wholesome soups.
3. Light and toothsome breads without yeast, leaven baking powder, soda ammonia or saleratus.
4. Meats and meat substitutes.
5. Mushes and something better.
6. Vegetables.
7. The Reason Why of the New Cookery. Gen. prin.
8. Invalid foods and infant diet.
9. Fruits, their uses, how to c ook and serve.
10. Nuts and nut products.

(School of Health.)

PHYSICAL CULTURE.

1. General Ideas. Physiology and anatomy of muscles.
2. Bodily symmetry, how to develop, beauty.
3. How to be strong. Swimming.
4. How to cure weak backs.
5. How to develop weak lungs.
6. How to cure weak heart.
7. How to cure wrinkles.
8. Correct and incorrect attitudes.
9. Walking, stair-climbing,
10. Exercises for the too fat, the too thin, rheumatics, feeble invalids and children.

D I E T .

1. Foods--Man's natural diet.
2. Chemistry of food and digestion.
3. Common errors in diet.
4. Dextrinized foods.
5. The perfect way in diet.
6. Evils of conventional dress.
7. Simple remedies. Fom. etc.
8. The body a temple of--etc.
9. Simply remedies, --cold water drinking; fevers etc.
10. Diet and intemperance, tea, coffee, alcohol, small beer, etc.

MEMO.

Look up the composition of bread fruit.

Relating to epilepsy--Hunt up my own experiments determining toxicity .

Look up Forestius.

J. H. K.

F.

Aug 5 1988

MEMORANDA for Lecture on Fruits.

Antiseptic - Cents
Bacteriological
Chemical
Palatine
Sulphur
Sulphur dioxyl
H_2SO_4

THE THERAPEUTIC USES OF FRUITS.

Fruits have a preventive as well as a curative value. The human body is proof against the action of germs so long as the blood is pure, the tissues intact. It has been observed that the flesh of young foxes is much more palatable when they are fed on grapes. The use of fruit is conducive to purity of blood and tissue cleanliness through the physiological stimulus which they exert upon the kidneys, liver and other excretory organs, also through aseptic influence upon the stomach and intestines. If the stomach is kept pure and free from germs, the intestines will be. The fecal matters of a new born babe are aseptic. The first germ which appears is the colon bacillus. This germ is found present everywhere in the air from the dried excretions, being present in the colon of all animals. Fruit is the natural means of combatting this germ. As a curative, fruit is useful in nearly all acute and chronic diseases.

Acute forms of auto-intoxication. Most acute diseases are infection, symptoms due to ptomaines or toxines. A bilious attack, the most common form of infection, due to the formation of ptomaines by common putrefactive germs in the stomach and the intestines. Bilious attack, sick head-ache, migraine, nervous head-ache, all the same thing, differing in preponderence of stomach or head symptoms. Generally associated with dilated stomach,-food retained too long, putrefaction takes place. This occurrs, according to Bouchard, after five hours' retention.

Fruit-a remedy for biliousness, because of the acid present. Sour stomach never produces biliousness but an alkali or proteid fermentation giving rise to systemic poisoning.

Intestinal infection. Diarrhoea, Dysentery, cholera morbus, cholera infantum, winter cholera, summer complaint, acute catarrh. All, amenable

to. treatment by fruit diet. Pliny used grapes without seeds or skins for diarrhoea and dysentery. The Galleu + Arabian and German physicians of the middle ages, also Forestius did the same. In the war, bowel troubles were cured by the free use of ripe peahhes.

Infectious jaundice, acute inflammation of the liver, acute inflamgation of the kidneyw, uremia, require fruit juices, fruit pulp,--should be followed by a fruit diet.

Fevers of all sorts require a fruit diet. The fruit soups of Germany, one part fruit to four or five of water.

Malarial fevers, relating to stomach disorder.

Typhoid, relation to dilatation of the stomach.

Fever from colon bacillus, relation to Typhoid, constant danger.

All the eruptive fevers, small pox, measles, etc. diptheria, whooping cough, mumps, pneumonia, consumption, ~~pneumonia~~, pleurisy.

van Swieten cured a patient of consumption by making him eat twenty lbs. of strawberries a day.

Chronic auto-intoxications,-rheumatism, relation to dilatation of the stomach and uric acid. Meat diet increases the infection. Linnaeus cured gout in himself by living on a fruit diet.

Neurasthenia, --dilatation of the stomach which effects the Sympathetic especially. Hagues observation respecting neurasthenia.

Chronic insomnia--usually toxinea. Chron. alcoholism. Constipation.

Bright's Disease, relation to dilatation of the stomach. Hague's vuews respecting relation of uric acid . Uric premonitory symptom.

Chronic hypertrophy of the liver. Sclerosis and dropsy require frui diet because of logs of antiseptic power of the liver.

Chronic skin diseases. Eczema, relation to dilatation of the stomach.--Bouchard. Chlorosis, anemia, auto-intoxication affecting blood making organs. Pliny cured skin dis with Grapes

Hysteria--relation to indigestion. Sympathetic nervous system.

Hypochondria---Pliny 's hypochondria was cured by a grape diet. An analogue of hysteria. Evidence of auto-intoxication in hypochondria disappears with cleaning of tongue.

Epilepsy--relation to indigestion. Ptomaines, meat eating. Cats and epilepsy. (Refer to my own experiments determining toxicity.) Dr. Wagner Dr. Dugan

Hoffman cured lunacy with strawberries and investigation shows the toxicity enormously increased in lunatics , expecially in melancholia mania.

Arterio sclerosis from old age. Relation to uric acid, general toxinea. Mention cases of premature old age with dilated stomach.

Apoplexy, paresis, locomotor ataxia, sclerosis.

Other maladies not due to toxinea.--Obesity, diabetes, convalescence from fevers, sedentary life, Hyperpepsia, Hypopepsia, Apepsia, simple dyspepsia.

Fruit Diet. Two forms.

1. Strict fruit regimen.

2. Modified fruit regimen.

First,-strict fruit regimen, so-called fruit cure, best-grape, peaches, apples, strawberries, apricots, cherries. Other fresh fruit may be used. When not available, raisins may be used instead. Fruit must be thoroughly ripe. The grape cure best established. Used in Switzerland, Italy, California, Australia, South Africa, and near Cincinnati.

Rules. Fruit must be taken by itself in extreme cases to the exclusion of all other foods, but in all cases should be received into an

empty stomach.

2. Potatoes, butter, eggs, cheese, rich gravies, pastry, all greasy foods prohibited during the grape cure.

3. Seeds and skins must be rejected.

4. Quantity, three to eight pounds, daily, sometimes fourteen lbs. when no other food is taken.

5. May be taken at intervals of four hours if other food is not taken. A strict fruit regimen may be continued from one to two days to two weeks as a sort of fasting.

A strict fruit regimen over hungry cure-(Advantages.) Accomplishes the same result without discomfort, with less depletion of the body and also disinfects.

A small crust of zwiebach may be allowed, or Granose, with a strict fruit regmen once or twice a day.

Modified fruit regimen.--Allow one mixed meal a day--fruits, grains and nuts, and one or possibly two meals of fruits. Mixed meals should be eaten in the middle of the day--the fruit meals, morning and evening. The modified fruit diet may be continued indefinitely. May be used advantageously several weeks or months in most cases of chronic infection with dilatation of the stomach with Hypopepsia.

Another form of modification--A fruit diet exclusively for one or two days of each week.

Another form ~~adopted~~ --Adopt a fruit diet exclusively when threatened with headache, an attack of biliousness rheumatism, etc.

Contraindications of the vegetable

Memo. for Lecture on Dietetics to the Medical Students.

The vegetable world nature's means of storing energy derived from the sun.

All energy comes from the sun.

A potato sprouting in the dark grows only until it has exhausted the energy stored.

The vegetable stores energy, the animal expends energy.

The body is a form through which a stream of matter flows, not as water flows through a tube, but as mist particles pass through a rainbow, the form remaining the same, the matter changing. ~~The amount of matter~~

The amount o matter varies with the activity of the stream.

Human being eats practically his own weight once a month.

Estimate food in the condition in which it is taken.

The amount of food required depends upon the amount of energy expended.

Each person expends per day 2,700,000 grams centigrains; the amount of work 300,000 kilogram meters.

One heat unit,-- that is, one gram of water raised one degree centigrade,-- equals 425.5 gram meters of work.

The number of food units in different food elements are about as follows:--

Casein, 5800.

Animal fiber, 5800.

Vegetable fiber, 6200.

Starch, 4500.

Sugar, 4200.

Suet, 900+.

Albumen, or proteids, may, on the average, be said to be 6000, or, if allowance is made for the urea (albumen not being completely oxidized) the number of units is reduced to 5100.

Reducing these to Fahrenheit grains, we have for

Albumen, 600.

Fat, 1134.

Starch, 526.

Sugar, 490.

Problem: from the above data and the table of nutritive values, make table showing the food units contained in each of the ordinary food substances.

FRUITS.

Special characteristics:--

Acids: citric, malic, tartaric.

Citric in lemons, limes, oranges, grape fruit, shaddock.

Malic in apples, pears, peaches, apricots, blueberries, currants.

Tartaric in grapes.

Experiment with these several acids:--

Test their effects upon starch digestion, both artificial and in the stomach.

Test the acidity of the different fruits-- apples, bananas, and other fresh fruits, also canned fruits.

Note the influence of sugar upon chemical acidity.

Sugar:-- levulose, glucose, and dextrose.

Absence of starch when the fruit is ripe.

Absence of fat except in olives and figs, the latter containing 1.4 of fat.

Pectose.

Little albumen, 1% in strawberries, 4% in figs, 2.4 in raisins.

Most fruit 1/2% of albumen.

Sugar varies from 1.5% in the peach to ten times the quantity in the grape.

Green fruit contains starch.

In process of ripening starch changes to levulose and dextrose.

Flavors of fruit are due to volatile ethers.

In ripening, tannic and other acids reduced in quantities.

Germicidal influence of fruit juices.

Citric acid destroys cholera and typhoid fever germs.

Koch.

Tartaric acid in the proportion in which it is found in natural fruit.

The proportion of acids in common fruits:

Apple, .84

Pear, .20

Peach, .92

Grape, .79

Strawberry, .93

Currant, 2

Orange pulp 2.44

The proportion of sugar contained in fruits:

Peaches, apricots, plums, 1 1/2%

Raspberries and blackberries, 4%

Strawberries, huckleberries, currants, prunes, 3%

Gooseberries 7%

Apples 8%

Sweet cherries, 11%

Grapes, 15%

Sour cherries, 8.8%

The fruit may have a sweeter or more sour taste, according as it has more sugar and less acid, or the reverse.

Skins of fruit are water- and germ-proof.

Skins of seeds are indigestible and are generally to be rejected, always by invalids.

Uses of fruit:

1. Supply water, pure-- melons, fruit in hot countries, malaria.

2. Nutriment. The banana, fig, prune, apple, date, and grape.

Arabs, camels, horses.

Stanley ate banana flour.

3. Influence upon urinary secretion.

Lessens acidity.

May make alkali by decomposing salts in blood and tissues.

Hence, useful in gout and rheumatism.

Increases flow of urine.

4. Laxative, from effects of acids on cellulose.

Apples, figs, berries, organges, peaches, prunes.

5. Peptogen.

Acid, sugar, dextrine flavors, influence upon salivary secretion.

6. Asepsis of the stomach.

Use when bilious, etc.

Fresh fruits more digestible than dried.

7. Dietetic treatment of special ailments. Obesity, dyspepsia biliousness, rheumatism, autointoxication.

Acid, fruit in diabetes-- plums, apricots, sour oranges, lemons.

Lemon juice will control hemorrhage of the nose and uterus.

8. Digestibility.

Fresh fruit better than dried or stewed, if well ripened.

Dried hard of digestion.

Green must be cooked.

Most digestible fruits: peaches, grapes, strawberries, raspberries, baked apples, steamed figs.

Next best: very ripe raw apples, pears, apricots, bananas, stewed prunes, melons if pulp is not swallowed.

Fruit soups. One part fruit to four or five of water.

Especially valuable in fevers.

Germany.

Tropical fruits.

Banana flour.

Combination of fruits with other things.

Fruit fasting: contra-indications of fruits.

Experiments with fruits.

Salivary digestion.

Banana flour compared with starch for two hours.

Contraindications acid fruits in hyperpepsia.

Fruit pulp in intestinal irritation, with vegetables in case of feeble digestion.

Never after a hearty meal.

Best effects when taken by itself.

Never between meals, unless just before a meal.

Combined best with nuts, next best with nuts and grains.

Van Sweiten ate twenty pounds of strawberries a day, and cured consumptives with strawberries and lunatics with cherries.

Hoffman reported similar cases.

Forestus cured inveterate chronic diarrhoea by very ripe medlars.

Linnaeus, who suffered from gout, successfully treated himself

with a fruit diet.

In the Civil War obstinate bowel troubles were rapidly cured by eating ripe peaches.

Pliny recommended the grape cure, also Gallen, and Arabian and German physicians of the middle ages.

The grape cure was used in Switzerland, forawhile near Cincinnati, California, Australia, Cape of Good Hope.

The flesh of young foxes is more palatable when fed on grapes, a significant fact long ago observed.

A pound and a quarter of grapes contain as much albumen as one egg.

Pliny says grapes were successfully used, without seeds or skins, for diarrhoea, dysentery, gout, chronic skin diseases.

Sweet, well ripened grapes must be used.

Most useful in constipation and hypochrondia, chlorosis, anemia, chronic alcoholism, sexual neurasthenia.

The quantity used three to eight pounds daily, with or without other food.

The fruit is taken on an empty stomach exclusively, or with a small crust, divided in three or four portions at intervals during the day.

Begin with one or two pounds, adding a half pound daily for one to six weeks.

Potatoes, eggs, cheese, greasy foods, are interdicted.

Sugar in fruits:--

Peaches, apricots, plums, 1 1/2 to 2%.

Raspberries, blackberries, 4%.

Strawberries, huckleberries, currants, prunes, 6%

Apples, 8%

Sour cherries, 9%

Sweet cherries, 11%

Grapes 15%

NUTS.

The special characteristics of nuts are the large amount of fat and albumen they contain, and the absence of starch, with a few exceptions.

Chestnut contains about 70% of starch, the walnut 13%.

The almond and the cocoanut 8%

Peanut contains 28% of albumen.

Almond contains nearly as much albumen (23.5%)

The chestnut, walnut, and hazelnut contain 14 to 17%.

The almond contains more than 50% of fat.

The peanut and the walnut about the same amount.

The hazelnut and the filbert more than 60%.

The chestnut contains very little fat.

~~Nuts are rather indigestible in their ordinary state.~~

Peanut is not a nut proper, but related to beans and other leguminous seeds.

Use of cocoanut in tropical countries.

Interesting information from U. S. consuls.

Nuts indigestible in natural state.

Require cooking and disintegration.

Almond contains nitrogenous principle, emulsin.

Uses of nuts:

A source of fat and of proteids.

Vegetable analogue of meat.

Fat in a state of emulsion.

When cooked, nuts develop a flavor similar to that of meat.

The best nuts: the almond, filbert, chestnut.

Chestnut meal.

Used for bread.

The "acron" of the Romans.

The chemical analysis of these foods is as follows:

	Protein %	Fat %	Carbo. %	Salts %
Protose	21.3	10.2	2.8	1.4
Malted Nuts	23.7	27.6	43.9	2.2
Nut-Butter	16.4	26.4	9.5	not given
Granose	15.4	2.8	79.1	probably same as not given wheat=or more.
Granola	15.	3.0	75.0	"
Malt Honey	3.8	0.	49.6	"
Beefsteak	18.9	12.2	0.0	0.8
Entire Egg	14.0	10.5	0.0	1.5
Whole Wheat Bread.	8.7	6.0	64.0	3.0

Since the carbohydrates & fats are each destined to supply heat & energy to

Ounces of food material required to furnish the required ounces of proteid

Protose	13.1
Malted Nuts	11.8
Nut Butter	17.0
Granose	18.1
Granola	18.6
Malt Honey	72.4

For the sake of comparison I would add that it would take of

Beefsteak	14.8
Entire Egg	20.0
Whole Wheat (Fermented) (Bread)	32.3

613.2

Memo.

Nut Preparations:

Almond meal.

Nut meal (Peanuts) / nut butter, Peanut meal

Amydalac (Malt and almond meal.)

Bromose (Peanuts and malt.)

Granulose (Finest granose, boiled, mixed with 1-20 its weight of ~~diastase~~ malt meal. A smaller proportion of ~~diastase~~ malt meal may answer.)

Try experiment of separating casein from whey with rennet and HCl, dry, grind, add lactic acid and milk sugar or milk sauce, with and without malt or maltose.

Dr Harris Exp.

FRUITS, ONE WEEK EXPERIMENTAL.

	No. per.	Av. loss wt.	Av. gain wt. fol. wk.	Av. strength inc.	Urinary report			
					Amt.	Acidy.	Nea.	Solids
Bananas	7	6 4/7 lbs.	6 3/7 lbs.	6 gained 415 2/3 1 lost 600 lbs.	dec. inc.	dec.	dec.	dec.
Peaches	4	7 lbs.	7 1/4 lbs.	Gain 309	inc. in 2 Am.	dec.	inc.	inc. phos
Dates	4	4 3/4 lbs.	6 3/4 lbs.	Gain 317	dec.	dec.	dec.	---
Grapes	3	7 lbs.	5 1/2 lbs.	Gain 571	---	dec.	---	---
Raw fruits	3	3 lbs.	3 lbs.	Gain 296			dec.	
All fruits								
Apples								

STRENGTH TEST, SAME PERSON.

	Arms	Legs	Trnk.	Chest	Total
Oct. 12, Before breakf. 6 A.M.	1745	2610	1180	420	5955
Oct. 13, After breakf. 9 A.M.	2020	2640	1355	500	6515
Oct 14, After dinner 3 P.M.	2090	2775	1325	570	6770

P. S. Hoping from this you may derive some deductions or suggestions for further experimenting along this line.

A. W. H.

COPY.

Oct. 19, 1898:

Dr. Kellogg,

Dear Bro.:

Enclosed please find a short summary of experimental work on fruit diet.

I observe that while there is a loss in weight, there is a gain in strength throughout, possibly due to the cleansing effect upon the tissues, allowing of greater contractility of the muscules. Also that in one week's time the weight had been regained, and on regular diet in some instances more than regained.

I notice that all fruits (even acid) render the urine more alkali, proving that organic acids are changed into alkaline carbonates in the blood. Urea and solids were decreased with the exception of those on peaches, in which mea. and solids were inc.

In many instances amorphous phosphates were present after the test.. Those using the seeds with the grapes suffered considerable tenderness of the bowels, and stomach, and some diarrhoea.

Those without the seeds, no tenderness, but with some a slight diarrhoea.

Those on raw fruits (2 or 3 kinds at a meal) made no complaint, but did well.

Those on all fruits, a mixture, suffered from considerable fermentation, and consequent headaches, and had to be stopped before completing test.

Some tried the nut preparations, and where over 8 or 9 ¢ worth was taken at a meal, suffered from albuminous fermentation and showed symptoms of autointoxication, with some gain in weight, but great decrease in strength, and had to be stopped before test was completed.

Those on breads and one kind of fruit maintained their usual weight (as a rule) and also gained in strength.

Those on bread fruit and nut prep. maintained weight and gained considerable in strength.

In looking over my charts, I find that there was but one instance when a young man lost as high as ten pounds. This was J. E. Harrington, who lost just ten lbs. and later on volunteered a second test of a different nature.

I learn of one case sent to the lake-- this was a lady, Miss Ware, who lived 5 days on nut prep., advised to stop by myself.

Mrs. Herr and myself both took the test one week. I saw or received a written report daily from each experimenter, and was therefore careful to guard them against any permanent injury, and in many instances advised them to stop. And others who were doing extra work not to undertake the experiment, who volunteered to take it.

Some learned valuable lessons, so they say, one that he could get along with much less food than he had been eating. Others in conquering appetite, some in proper food combinations. Some testified that they "felt better physically and spiritually." Some that they never felt better in their lives. Many learned the lesson of simplicity in diet.

As soon as I have time to make a summary, I hope to give you a full report. However, believe me sorry wherein I have offended by not laying the matter before the faculty.

Resp.,

A. W. Herr.

Malt Honey fourth stage

Malts --flavor disagreeable; Malt Honey, distinct method

Great discovery, process expensive , later may be cheapened

Cheap because stomach work is costly, how to get it done for us in the Laboratory

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A. W. H.

MEMORANDA for Lecture on Fruits.

THE THERAPEUTIC USES OF FRUITS.

Fruits have a preventive as well as a curative value. The human body is proof against the action of germs so long as the blood is pure, the tissues intact. It has been observed that the flesh of young foxes is much more palatable when they are fed on grapes. The use of fruit is conducive to purity of blood and tissue cleanliness through the physiological stimulus which they exert upon the kidneys, liver and other excretory organs, also through aseptic influence upon the stomach and intestines. If the stomach is kept pure and free from germs, the intestines will be. The fecal matters of a new born babe are aseptic. The first germ which appears is the colon bacillus. This germ is found present everywhere in the air from the dried excretions, being present in the colon of all animals. Fruit is the natural means of combatting this germ. As a curative fruit is useful in nearly all acute and chronic diseases.

Acute forms of auto-intoxication. Most acute diseases are infection, symptoms due to ptomaines or toxines. A bilious attack, the most common form of infection, due to the formation of ptomaines by common putrefactive germs in the stomach and the intestines. Bilious attack, sick head-ache, migraine, nervous head-ache, all the same thing, differing in preponderence of stomach or head symptoms. Generally associated with dilated stomach,-food retained too long, putrefaction takes place. This occurrs, according to Bouchard, after five hours' retention.

Fruit-a remedy for biliousness, because of the acid present. Sour stomach never produces biliousness but an alkali or proteid fermentation giving rise to systemic poisoning.

Intestinal infection. Diarrhoea, Dysentery, cholera morbus, cholera infantum, winter cholera, summer complaint, acute catarrh. All, amenable

to treatment by fruit diet. Pliny used grapes without seeds or skins for diarrhoea and dysentery. The Galen + Arabian and German physicians of the middle ages also Forestius did the same. In the war, bowel troubles were cured by the free use of ripe peaches.

Infectious jaundice, acute inflammation of the liver, acute inflammation of the kidneys, uremia, require fruit juices, fruit pulp,--should be followed by a fruit diet.

Fevers of all sorts require a fruit diet. The fruit soups of Germany, one part fruit to four or five of water.

Malarial fevers, relating to stomach disorder.

Typhoid, relation to dilatation of the stomach.

Fever from colon bacillus, relation to Typhoid, constant danger.

All the eruptive fevers, small pox, measles, etc. diptheria, whooping cough, mumps, pneumonia, consumption, ~~xxxxxxxx~~, pleurisy.
van Swieten cured a patient of consumption by making him eat twenty lbs. of strawberries a day.

Chronic auto-intoxications,-rheumatism, relation to dilatation of the stomach and uric acid. Meat diet increases the infection. Linnaeus cured gout in himself by living on a fruit diet.

Neurasthenia, --dilatation of the stomach which effects the sympathetic especially. Hague's observation respecting neurasthenia.

Chronic insomnia -usually toxinea. Chronic alcoholism. Constipation.

Bright's Disease, relation to dilatation of the stomach. Hague's vuews respecting relation of uric adid . Uric premonitory symptom.

Chronic hypertrophy of the liver. Chlorosis and dropsy require frui diet because of loss of antiseptic power of the liver.

Chronic skin diseases. Eczema, relation to dilatation of the stomach.--Bouchard. Chlorosis, anemia, auto-intoxication affecting blood making organs.

Hysteria--relation to indigestion. Sympathetic nervous system.

Hypochondria---Pliny 's hypochondria was cured by a grape diet. An analogue of hysteria. Evidence of auto-intoxication in hypochondria disappears with cleaning of tongue.

Epilepsy--ralation to indigestion. Ptomaines, meat eating. Cats and epilepsy. (Hunt up my own experiments determining toxicity.)

Hoffman cured lunacy with strawberries and investigation shows the toxicity enormously increased in lunatics , especially in melancholia mania.

Arterio sclerosis from old age. Relation to uric acid, general toxinea. Mention cases of premature old age with dilated stomach.

Apoplexy, paresis, locomotor ataxia, sclerosis. Cancer

Other maladies not due to toxinea.--Obesity, diabetes, convalescence from fevers, sedentary life, Hyperpepsia, Hypopepsia, Apepsia, simple dyspepsia. Cancer

Fruit Diet. Two forms.

1. Strict fruit regimen.

2. Modified fruit regimen.

First,-strict fruit regimen, so-called fruit cure, best-grape, peaches, apples, strawberries, apricots, cherries. Other fresh fruit may be used. When not available, raisins may be used instead. Fruit must be thoroughly ripe. The grape cure best established. Used in Switzerland, Italy, California, Australia, South Africa, and near Cincinnati.

Rules. Fruit must be taken by itself in extreme cases to the exclusion of all other foods, but in all cases should be received into an

empty stomach.

2. Potatoes, butter, eggs, cheese, rich gravies, pastry, all greasy foods prohibited during the grape cure.

3. Seeds and skins must be rejected.

4. Quantity, three to eight pounds, daily, sometimes fourteen lbs. when no other food is taken.

5. May be taken at intervals of four hours if other food is not taken. A strict fruit regimen may be continued from one to two days to two weeks as a sort of fasting.

A strict fruit regimen over hungry cure-(Advantages.) Accomplishes the same result without discomfort, with less depletion of the body and also disinfects.

A small crust of zwiebach may be allowed, or Grape-se, with a strict fruit regimen once or twice a day.

Modified fruit regimen.--Allow one mixed meal a day--fruits, grains and nuts, and one or possibly two meals of fruits. Mixed meals should be eaten in the middle of the day--the fruit meals, morning and evening. The modified fruit diet may be continued indefinitely. May be used advantageously several weeks or months in most cases of chronic infection with dilatation of the stomach with Hypopepsia.

Another form of modification-A fruit diet exclusively for one or two days of each week.

Another form. ~~adopted~~ --Adopt a fruit diet exclusively when threatened with headache, an attack of biliousness, rheumatism, etc.

Preconcentrated Vegetables.

Sugar in fruits:--

Peaches, apricots, plums, 1-1/2% to 2%.

Raspberries, blackberries, 4%.

Strawberries, whortleberries, currants, prunes, 6%.

Apples, 8%.

Sour cherries, 9%.

Sweet cherries, 11%.

Grapes, 15%.

Memo. for Lecture on Dietetics to the Medical Students.

Themvegetable world nature's means of storing energy derived from the sun.

All energy comes from the sun.

A potato sprouting in the dark grows only until it has exhausted the energy stored.

The vegetable stores energy, the animal expends energy.

The body is a form through which a stream of matter flows, not as water flows through a tube, but as mist particles pass through a rainbow, the form remaining the same, the matter changing.

The amount of matter varies with the activity of the stream.

Human being eats practically his own weight once a month.

Estimate food in the condition in which it is taken.

The amount of food required depends upon the amount of energy expended.

Each person expends per day 2,700,000 grams centigrains; the amount of work 300,000 kilogram maters.

One heat unit,-- that is, one gram of water raised one degree centigrade, equals 425.5 gram meters of work.

The number of food units in different food elements are about as follows:

Casein, 5800.

Animal fiber, 5800.

Vegetable fiber, 6200.

Starch, 4500.

Sugar, 4200.

Suet, 9004.

Problem: from the above data and the table of nutritive values, make table showing the food units contained in each of the ordinary food substances.

FRUITS.

Special characteristics:--

Acids: citric, malic, tartaric.

Citric in lemons, limes, oranges, grape fruit, shaddock.

Malic in apples, pears, peaches, apricots, blueberries, currants.

Tartaric in grapes.

Experiment with these several acids:

Test their effects upon starch digestion, both artificial and in the stomach.

Test the acidity of the different fruits-- apples, bananas, and other fresh fruits, also canned fruits.

Note the influence of sugar upon chemical acidity.

Sugar:

Levulose, glucose, and dextrose.

Absence of starch when the fruit is ripe.

Absence of fat except in olives and figs, the latter containing 1.4 of fat.

Pectose.

Little albumen-- 1% in strawberries, 4% in figs, 2.4% in raisins.

Most fruit 1/2% of albumen.

Sugar varies from 1.5% in the peach to ten times the quantity in the grape.

Green fruit contains starch. In process of ripening starch changes to levulose and dextrose.

The flavors of fruit are due to volatile ethers.

In ripening, tannic and other acids reduced in quantities.

Germicidal influence of fruit juices. Citric acid destroys cholera and typhoid fever germs.

Koch.

Tartaric acid in the proportion in which it is found in natural

fruit.

The proportion of acids in common fruits:--

Apple, .84.

Pear, .20.

Peach, .92/

Grape, .79.

Strawberry, .93,

Currant, 2.

Orange pulp, 2.44.

The proportion of sugar contained in fruits:--

Peaches, apricots, plums, 1 1/2%. — 2

Raspberries and blackberries, 4%.

Strawberries, huckleberries, currants, prunes, 6%.

Gooseberries, 7%.

Apples, 8%.

Sweet cherries, 11%.

Grapes, 15%.

Sour cherries, 6.8%.

The fruit may have a sweeter or more sour taste, according as it has more sugar and less acid, or the reverse.

The skins of fruit are water- and germ-proof. The skins of seeds are indigestible and are generally to be rejected, always by invalids.

Uses of fruit:--

1. Supply water, pure-- melons, fruit in hot countries, malaria.

2. Nutriment.

Banana, fig, prune, apple, date, and grape.

Arabs, camels, horses. Smyrna

Stanley ate banana flour. Dr Jameson

3. Influence upon urinary secretion.

Lessens acidity. of urine

May make urine alkali by decomposing salts in blood and tissues, here

hence useful in gout and rheumatism, toxaemia - intestinal asepsis

Increases flow of urine.

4. Laxative, from effect of acids on cellulose.

Apples, figs, berries, oranges, peaches, prunes.

5. Peptogen.

Acid.

Sugar.

Dextrine, flavors.

Influence upon salivary secretion.

6. Asepsis of the stomach, use when bilious, etc.

Fresh fruits more digestible than dried.

7. Dietetic treatment of special ailments.

Obesity.

Dyspepsia.

Biliousness.

Rheumatism.

Autointoxication.

Acid, fruit in diabetes-- plums, apricots, sour oranges, lemons

Lemon juice will control hemorrhage of the nose and uterus.

8. Digestibility.

Fresh fruit better than dried or stewed, if well ripened.

Dried hard of digestion.

Green must be cooked.

Most digestible fruits: peaches, grapes, strawberries, raspberries, baked apples, stewed figs.

Next best: very ripe raw apples, pears, apricots, bananas, stewed prunes, melons if pulp is not swallowed.

Fruit soups. One part fruit to four or five of water.

Especially valuable in fevers.

Germany.

Tropical fruits:

Banana flour.

Combination of fruits with other things.

Fruit fasting:

contraindications for fruit.

Experiments with fruits.

Salivary digestion.

Banana flour, compared with starch for two hours.

Contraindications acid fruits in hyperpepsia.

Fruit pulp in intestinal irritation, with vegetables in case of feeble digestion. Never after a hearty meal.

Best effects when taken by itself.

Never between meals, unless just before a meal.

Combined best with nuts, next best with nuts and grains.

Van Sweiten ate twenty pounds of strawberries a day, and cured consumptive with strawberries, and lunatics with cherries.

Hoffman reported similar cases.

Forestius cured inveterate chronic diarrhoea by very ripe medlars.

Linnaeus, who suffered from gout, successfully treated himself with a fruit diet.

In the Civil War obstinate bowel troubles were rapidly cured by eating ripe peaches.

Pliny recommended the grape cure, as did also Gallen, and Arabian and German physicians of the middle ages.

Grape cure was used in Switzerland, for awhile near Cincinnati, California, Australia, Cape of Good Hope.

Flesh of young foxes is more palatable when fed on grapes, a significant fact long ago observed.

A pound and a quarter of grapes contain as much albumen as one egg.

Pliny says grapes were successfuly used, without seeds or skins, for diarrhea, dysentery, gout, chronic skin diseases. Sweet, well ripened grapes must be used.

Most useful in constipation and hypochrondia,--

chlorosis,

Anemia,

Chronic alcoholism.

Sexual neurasthenia.

The quantity used three to eight pounds daily, with or without other food.

The fruit is taken on an empty stomach exclusively, or with a small crust, divided in three or four portions at intervals during the day.

Begin with one or two pounds, adding a half pound daily for one to six weeks.

Potatoes, eggs, cheese, grasy foods, are interdicted.

W O O D C R A N K S :

In the dim long ago, in transcendential days in New England, food fad dists arose who announced that man should eat uncooked food: grain, dried fruits &teach nothing prepared by the aid of fire. That way lay sin-shared ruin? Some of these eccentrics wore shoes into the composition of which leather did not enter: they were vegetarian shoes and involved no slaughtering of cattle or kids. The strange dietary doctrines still survives in New York City. J.P. Thompson J. has during six years eaten only of uncooked vegetables. He argues that nature intends us to partake only of raw vegetables. He asserts that all energy comes from the sun, & says that "plants absorb the sunshine & hold the energy in their fibres, like coal, timber & minerals. Man & animals derive their energy from plant food because they cannot eat trees. Cooking causes chemical decomposition, derives vegetables from of a part of the energy which they have inherited of the sun & hence they are less beneficial to mankind then when eaten raw. Mr Thomas, his wife and his child, one year old, subsist almost exclusively on raw wheat & other cereals, raw potatoes, cabbage, turnips & all other vatieties of vegetables & fruit. As a consequence they never are ill, they seem susceptible of cold, they wear their garments without underclothing over coats or wraps the year round. Mr Thomas claims to have the strength of four men, and can lift 1'450 pounds. This is the strictest sort of vegetarianism & recalls the Massachusetts cranks who chewed raw wheat and raw corn, and held themselves superior to other men. Thoreau never went so far, but he was enticed into adopting the broader vegetarian diet, & after a trial of it declared that his thinking grew thin and vapory and so he returned to the familiar fleshpots. Thoreau though clearly enough on a vegetarian diet, but died of consumption at an early age. Directly opposed to the vegetarian diet is the Graham system of living on chopped meat made up into palatable little cakes, and drinking hot water as a beverage. Then there is the comparatively new nut and dried fruit diet, the monkey menu, the real old simian bill of fare. There are people who profess to relish sunflower & peanut butter & oily nuts of uncertain age. They fill their stomachs with this stuff and gaze at the rest of us with Olimpian disdain. We are far from arguing against vegetarianism which, for some people, does admirably, and it is probable that too much meat is eaten, but all exclusive dietaries appear to be contrary to nature. Man is a broad eater, and thrives best when generously fed.

My personal experience: While abstaining more or less from meat & a greater warmth of body or comfortable feeling in the cold air and quicker digestion, accompanied by less thirst regular smaller offals & calmer quieter sensation at worry discomfort, & general annoyance. Increase of appetite, endurance, slightly in weight but decidedly strength. All of which the contrary is found on heavy meat entered drinkers. Especially coffee & tea are weakening, irritating, & soon abusing after. Dried fruits, bananas, beans, peas, lentils seem to agree vegetarian. Cold sponge baths, exercise in the fresh air mornings add wonderfully to the better feeling with this diet & stomach troubles seldom recur. Moral convictions are better sustained & a sense of content prevails. Economy, simpler ways of cooking & keeping are naturally connected. Veg: That rice, mush, oatmeal, beans lentils, peas are cleaner than meat, are easier taken in quantities harmless, preserve better is doubtless. Preserved meats, oysters, even salmon have caused lately diseases, just as sardines and french goose livers stuffed, seriously for many days. One friend being under treatment being pronounced as a very sick man. Requires thirty days absence under the physicians care from duties. Probably ten or follows are found & converted with much difficulty. Custom attaches heavily to the difficulty of providing proper food. to be prepared in the proper way. Guides for cooking a necessity. The propagation of GRAHAM meal one of the first considerations of. Whole wheat preparations cheap, of easy access in purchase paramount. Even the earnest follower needs these facilities to stay off meat.

AGAR: A form of cellulose obtained from seaweed. Absorbs many times its weight and dissolves in boiling water like gelatin. One part to 200 of water forms a jellylike mass at ordinary room temperature. An excellent non-irritating bulkage. It is not digestible and has no food value, but with fruit or vegetable juices makes excellent jellies.

BETA LACTOSE OR B-LAC: The new health sugar prepared from lactose or milk sugar having the same chemical composition, but three times as sweet and more than three times as soluble. Its flavor is preferred by manyto that of cane sugar which it satisfactorily replaces for table use. Beta lactose is equally as efficient as ordinary lactose or dextrin for changing the intestinal flora. For sweetening,it is far superior to cane sugar because it does not irritate the intestine as does cane sugar and encourages the growth of protective bacteria while cane sugar encourages the growth of disease producing germs (Cruickshank). It should be used in place of cane sugar for bottle-fed infants.

BRAN BISCUIT: A convenient form of bulkage which encourages mastication and is excellent for the teeth. It is very toothsome.

COOKED BRAN: This is the original sterilized bran, the mother of all the different brands of bran. First much ridiculed, now a best seller. Has food energy value as well as bulkage. Rich in vitamin B and food minerals. Well cooked and ready to serve with breakfast cereals, soups or stewed fruits. Makes delicious muffins, waffles and griddle-cakes.

DIABETIC FOODS: We were pioneers in the preparation of special foods for diabetics. Our glutens were the first standard preparations. So-called gluten flour was formerly a mixture of whole wheat flour and middlings. Our 40 per cent gluten antedated the present government standard

by a dozen years or more. We were the first to make a reënforced or pure gluten flour and established a standard which was later adopted by the government. Our glutens are now widely imitated, but have no superiors. Gluten flour contains _____ times as much gluten as ordinary flour and only half as much carbohydrates.

GLUTEN BREAD IN TINS: Toothsome as though just from the oven. Prepared from Sanitarium Gluten Flour. Keeps indefinitely.

GLUTEN TOAST: Thin slices of gluten bread toasted crisp, slightly brown, tasty and toothsome.

40 PER CENT GLUTEN BISCUIT: For more than a third of a century a standard food for diabetics. The first of the kind. A staple bread for diabetics for more than a third of a century. Contains four times as much gluten as ordinary bread. Low in starch.

PURE GLUTEN BISCUIT: Crisp, toothsome finger rolls containing only a minute quantity of starch (2 per cent).

KABA: A highly efficient natural laxative. Combines all the needed factors,-- bulkage, lubrication, energizing. Contains no drug. Not habit forming. An efficient colon food. Greatly aids in maintaining a good flora.

KAFFIR TEA: The leaf buds of a shrub which grows on the highlands of the Cape of Good Hope. Rivals Japan tea in aroma and flavor. Contains no caffein. A refreshing drink either hot or cold. Aids sleep instead of preventing it.

LACTO-DEXTRIN: A combination of two special protective foods provided by Nature to protect the intestinal tract, especially the colon, against putrefactive and poison-forming germs by encouraging the growth of the protective germ acidophilus. A highly efficient remedy in most forms of indigestion. Of great value as an aid in preventing and curing

colitis, gastric ulcer and other intestinal infections. Better than soda for relief of acidity. Improves appetite and sweetens the breath.

LAXA: A combination of wheat bran and agar, two most excellent forms of bulkage which supplement each other, bran supplying superior bulkage with a powerful intestinal stimulant, vitamin B, and agar supplying both excellent bulkage and lubrication. Crisp and toothsome like dry toast and highly convenient, especially in traveling. Laxa is a good source of all the needed vitamins, A, B, C, D, E, and G balanced to meet the needs of the body.

KRUSTY BRAN: Bran in a new and attractive form. Crisp, toothsome pellets which contain all the bran, including the germ (which is usually excluded from ordinary bran). It also contains in significant quanties all the vitamins, A, B, C, D, E, and G, and is rich in iron and phosphates, thus adding to its efficiency as a laxative food and making it a potent aid in combating all forms of vitamin deficiency. Sweetened with raw sugar, which is a good source of blood building iron.

MALTED NUTS: A plant milk preparation resembling malted milk. Possessed of extraordinary nutrient properties which stimulate the flow of milk in nursing mothers when other measures fail. An ample food for bottle-fed infants. A life saver as a substitute for dairy milk in infants or adults who are sensitized to milk. Malted Nuts is vitamized, containing significant quantities of all the vitamins, A, B, C, D, E, and G. In either hot or cold water it forms a delicious beverage. It may also be used dry as an addition to breakfast foods or stewed fruits.

MELTOSE OR MALT HONEY: A syrup resembling honey or ordinary syrup in appearance, but in flavor more like honey, having a very distinct highly palatable flavor of its own. More readily absorbed than ordinary sugar. May be taken freely without causing irritation. Stimulates the

flow of the digestive juices. Mixed with cream or olive or other vegetable oil it is highly fattening. Lean folks have been known to gain several pounds a week by making free use of Malt Honey. Vitamized Meltose is a rich source of all the vitamins, A, B, C, D, E, and G, and highly beneficial in cases of vitamin deficiency.

MELTOSE SUGAR: A natural sugar prepared from Meltose or Malt Honey, having identical properties. In every way preferable to cane sugar for bottle-fed infants.

SOYAN: A delicious food beverage with a coffee-like aroma and flavor by many preferred to decaffeinated coffees. Superior to all coffees in the fact that it is a good source of vitamins A and D. A warm cupful of Soyan at bedtime aids sleep instead of preventing it as does ordinary coffee.

INSTANT SOYAN: Instant Soyan possesses all the properties of soyan and is ready for instant use. It dissolves readily in either hot or cold water. Relieves the sensation of heaviness when experienced after eating. Free from all the objectionable features of ordinary coffee and a good source of vitamins A and D.

NUTTOSE: Vitamized. A pure nut product closely resembling potted meats. Contains all the vitamins in significant quantities and balanced to meet the needs of the body.

PARALAX WITH AGAR: As its name indicates, a preparation of mineral oil which has been emulsified by the addition of agar, giving it the consistency of cream, and has a very agreeable flavor. The mineral oil used in this preparation has been subjected to a special process for removing certain unwholesome substances found in ordinary mineral oils.

PARAMELS: Ordinary mineral oil has low efficiency because it

does not mix with food. Inconvenient because it leaks. Unpleasant to take. Causes serious loss of fat-soluble vitamins A, D, and E.

PROTOSE: A purely vegetable product which looks like meat and tastes like meat and has fiber like meat and has the nutritive properties of meat. Its protein is of superior quality and it is wholly free from all objectionable features of meat and meat products. May replace meat satisfactorily in all sorts of meat dishes, steaks, roasts, stews, sandwiches, salads, hash and sausages.

PSYLLA: An oriental seed, Plantago psyllium, which in contact with moisture swells prodigiously, producing an ideal bulkage, a soft mucilaginous mass which stimulates the intestine without causing irritation.

PARAMELS: The best way of taking is to take small bits along with other food requiring chewing or to melt and mix with hot soup or coffee.

PSYLLA WAFERS: Bran wafers with the addition of psyllium seed, an ideal combination.

RICE BISCUIT: The most dainty and digestible of cereal foods. Rice flakes pressed into biscuit form. Contains no raising ingredients. Welcome to persons sensitized to wheat.

RICE FLAKES: Most delicate and easily digestible of all cereal foods. Contains all the rice, including the polish. A good source of vitamins A, B, D, and E.

RUSK: A dainty morsel of the Holland rusk type containing the whole wheat. Enriched by added germ and soy flour to supplement the cereal protein.

SAVITA: A protective food prepared from yeast and other plant sources rich in vitamins and in addition supplies the rich flavors of

the attractive osmazomeswhich give to meats their popularity. By means of Savita, soups, broths, entrees, roasts, sandwiches and other similar dishes may be made as attractive as meat dishes with none of the objectionable features of meat dishes. Savita is presented in several forms: Savita in pots, a paste used in cookery and in the preparation of Savita butter. A delicious addition to vegetables and sandwiches.

SAL SAVITA: Savita in dried powdered form for use with a shaker like celery salt.

SAVITA SAUCE: A highly palatable liquid preparation rich in meat-like flavors of purely plant origin. Adds attractiveness to all vegetable dishes, entrees, soups and bouillons.

SAVITA CUBES: A highly concentrated blend of plant flavors with yeast extract and a balanced assortment of plant vitamins. Dissolves quickly in hot water to form a delicious refreshing highly nourishing vitamin broth.

VITAMIZED YEAST TABLETS: A new yeast tablet in which a highly potent yeast is reënforced by other highly potent plant vitamin concentrates of high potency. Each tablet contains the number of units indicated of each of the six well known vitamins. _____ tablets contain such amounts of the several vitamins that when added to the ordinary bill of fare, a full day's requirements will be insured.

SOY BEANS: Soy beans are perhaps the most remarkable of all food products. In China the soy bean supplies the place not only of meats of all kinds, fish flesh and fowl, but also eggs and milk. One pound of soy beans contains more protein than a pound of average meat, or 40 per cent its total weight and half as much of oil of superior quality, as much lecithin, a nerve building food, as a dozen eggs, besides

lime and iron and other salts. Its protein is of the same superior quality as that of eggs and milk, much superior to that of meat, and free from germs, parasites, uric acid and tissue wastes. The soy bean is more than a complete substitute for meat. It is naturally much richer in vitamins and lime and has the great advantage that it is a basic or alkaline ash food while the proteins of meats and cereals are acid and leave acid residues in the body which tend to cause acidosis. The soy bean combats putrefaction in the colon by encouraging and maintaining the growth of a protective flora, acidophilus.

Battle Creek Baked Soy Beans contain ten times as much vitamin B and seven times as much vitamin G as does beef and _____ times as much lime. Its natural vitamins are reenforced by other potent plant vitamins sufficient to give to each ounce of Battle Creek Baked Soy Beans the following vitamin units: _____ Seasoned with a delicious tomato sauce. Ready to serve direct from the can.

SOY GLUTEN BISCUIT: The protein of wheat and other cereals lacks certain elements necessary for tissue building. The lacking elements are super abundant in soy protein. In Soy Gluten Biscuit soy protein and wheat protein are combined in such proportion as to make good the deficiency of the cereal protein and make the whole available for tissue building. One of the most valuable of all nerve and muscle building foods. Alkaline in reaction.

LACTO-DEXTRINE

~~THE~~ A GREAT FOOD REMEDY

Soon after we discovered the formula which enabled us to produce Lacto-Dextrine and announced it to the medical profession, we began to receive from physicians who had prescribed it and patients who had used it, glowing reports of curative effects which were almost beyond belief - reports of relief from gastric and intestinal pains, from headaches (toxic), offensive stools, colitis, constipation, gas distension, coated tongue, foul breath, skin eruptions, chronic diarrhea and numerous other distressing ailments which had long resisted other measures - it began to look as though we had really made a notable discovery, one destined to mark an advance step in the progress of biologic physiologic therapeutics, or rational medicine which combats disease not by mitigating or hiding of symptoms only, but by removing the cause of the disorder and so compelling its disappearance.

But the report of cures were so varied and so numerous that we feared to list them, lest we should be accused of announcing a panacea, a cure-all. However, as years have passed, indisputable evidence has pyramided, until no room is left for doubt that in Lacto-Dextrine a <u>food remedy</u> has been developed, which possesses curative powers far exceeding in scope and thoroughness every food remedy previously known in this.

And a careful study of the long list of ailments reported as quickly and definitely cured by the use of this exceedingly palatable and nutritious food, as well as a highly potent remedy, disclosed the most significant fact that all those varied ailments and the miseries associated with them were closely related, being bound up together in a single bundle by the fact that they originate in a common cause, viz: infection of the gastro-intestinal tract, a condition which Lacto-Dextrine cured with almost the same dependability and certainty with which day follows night.

And thus the mystery and consequent improbability of Lacto-Dextrine therapy was dissipated, and this great food-remedy, with unblemished and unimpeached credibility hasten on to become one of the most famous and trusted household healing agents to be found wherever civilization has established its reigh of science and intelligence.

* The first appearance of "calories" on a bill of fare was on a menu prepared for a banquet given to the late Prof. Bowditch the dean of American physiologists, Harvard University. Our ~~your~~ menu presents for the first time data about both vitamines and food minerals (Calcium, phosphorus, iron and copper) which make

possible for the first
for a diner to assume
himself that he is getting
a full and complete
meal and one which
will adequately meet
each of his individual
needs.

New appliances,
improved methods, dis-
coveries in our research
departments and im-
portant additions to our

~~able~~ facility ~~make it~~
~~possible to do~~ ~~[illegible]~~ ~~ji~~
enable us to offer
more efficient ser-
vice to our patrons
than ever before.
So many improving
changes have been
made we feel sure
you would find a
return visit very much

while. ~~and we would very~~
~~much appreciate an~~
~~opportunity to~~
~~no doubt we would~~
~~be able with~~
our certain we would
be able to make them
a short play very
profitable ~~one for~~
new
One Feature of which
~~would~~ should interest you is

our new plan of intensive training for ~~out~~ the superhealth which the researches of Dr. Sherman have shown to be attainable by the new methods of dietary regulation and body culture which after being placed here may be continued at home.

We will be glad to
send you if you desire
a copy of our new
bill of fare to get the

Pan-Peptogen Experiments 10/29 '02

Exp. test meal on B.D.Field	A	A'	H	Pep.	Cal.Amt.	
Lav. prior to following meal	.030		.020	.9 mm		
1. 60 g Pan-peptogen, no water	.268	.232	.200	7.5 mm	69	No fluid obtainable required Double Lav
2. 60 g Potato puree 200 cc water	.310	.300	.190	9.0	17	
3. 60 g Potato puree) 200cc of 60 g Pan-peptogen) water	.168	.147	.128	20.0 mm	519	
4. 60 g Potato puree) 60 g Pan-peptogen) No water	.366	.306	.168	17.0 mm	159	
5. 60 g Potato puree) 30 g Pan-peptogen) No water	.284	.200	.120	14.0 mm	118	

Exp test Breakfast of Pan Peptogen

No. 18221

Laboratory of Hygiene of the Battle Creek Sanitarium

BATTLE CREEK, MICH.

J. H. KELLOGG, M. D., Superintendent. F. J. OTIS, M. D., Director. Dr Otis

Report of the Chemical and Bacteriological Examination of the Stomach Fluid Obtained after a Test Meal in the Case of

M. r. A. D. Field State Mich Date 10-10 1902

Test Meal.—Regular ..... Time of Digestion: 1 h. 0 m

Special. 6.0 g pan peptogen " .. h. m

PHYSICAL EXAMINATION.

Amount 60 c.c. Color n

Specific Gravity Odor n

Residue 27 grms. (normal 20 grms.) Blood 0

Estimated stomach contents 69 c.c. (normal 120 c.c.); Mucus {Normal — / Catarrhal — } free

MICROSCOPICAL EXAMINATION.

Blood ..... Misc .....

Pus .....

BACTERIOLOGICAL EXAMINATION.

Bacteria, No. per c.c. (30 c.c. = 1 oz.) { Aerobic 0 / Anaerobic 0 }

Yeast " " 0

Mold " " 0

Acid formation 0 Milk coagulation 0

Gas production 0 Gelatin liquefaction 0

Bread media 0 Fruit Media 0

DIGESTION OF PROTEIDS.

	Normal quantities.			
Total acidity	(.180–.200 grms.)	A	.268	grms.
Calculated acidity	(.180–.200 ")	A'	.232	"
Total chlorine	(.300–.330 ")	T	.320	"
Free HCl	(.080–.110 ")	H	.208	"
Acid combined chlorine	(.035–.055 ")	AC	.032	"
Neutral combined chlorine	(.020–.025 ")	N	.009	"
Total combined chlorine	(.090–.120 ")	C	.032	"
Fixed Chlorides	(.100–.110 ")	F	.088	"

Proteids.— Albuminoids 0 Syntonin 0 Propeptone + Peptone 0

Ferments Pepsin 7½ Rennet + Rennet Zymogen + **Bile** 0

DIGESTION OF STARCH.

Saliva, Reaction { Acid ..... / Alkaline ..... } amount in 5 m. 1 c.c. converted 0.1 grms. of starch in ... m.

Stomach Fluid
- **Maltose (M)** 12.786 grms.
- **Dextrin and Soluble Starch (D)** 2.138 "
- **Starch** Lugol's Sol.,— Blue, Violet, Brown, Yellow, Colorless.
- **Fatty Acids** (from fermentation) **(L)** 0.36 grms.
- **Lactic Acid** ..... **Acetic Acid** ..... **Butyric Acid** .....

COEFFICIENTS.

THE NORMAL COEFFICIENT IS 1.00, EXCEPT IN THE CASE OF FERMENTATION, AND BACTERIAL INFECTION IN WHICH IT IS 0.

Gastric Digestion { **Proteids (a)** 2.51 / **Starch (b)** (1) 1.04 (2) 4.31 }

Fermentation (x) 0

Bacterial Infection (g) 0

Solution (y) 9.0

Salivary Activity (c) —

Motility (z) 1.73

Relation of Chlorine separated (H + C) to total chlorine (T) (m) 1.28

Relation of Chlorine separated (H + C) to normal (n) 1.22

Coefficient of Capacity (k) (n2) 1.70

Diagnosis.— Classification .....

Remarks: .....

Prescription.— .....

Ran fever to test gave no acid and pep 1.

Classification of Functional Disorders of the Stomach

IN RELATION TO PROTEID DIGESTION

Based upon a Quantitative Chemical Examination of the Stomach Fluid Obtained after a Test Meal, in over 15,000 Analyses.

Modified from Hayem and Winter by J. H. KELLOGG, M. D.

HYPERPEPSIA. A′ + .

1. **A′ + H + C + (Typical)**..... (Both HCl and combined chlorin in excess.)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
2. **A′ + H 0, — or = C +**..... (Without excess of free HCl [H].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
3. **A′ + H + C — or =**..... (Without excess of combined chlorin [C].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

HYPOPEPSIA. A′ — .

1. **A′ — H — or 0 (Typical)**..... (All elements deficient.)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
2. **A′ — H = or +**..... (Without deficiency of HCl [H].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

APEPSIA. A 0 or — H 0 a 0 or —.

SIMPLE DYSPEPSIA. A′ = .

1. $a =$ { 1. Without fermentation (x 0) (normal). 2. With " (x +).
2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

EXPLANATION OF CLASSIFICATION.

In the study of over 15,000 stomach fluids, I have found it possible to include all cases of disorder of the chemico-vital processes of the stomach, as regards proteid digestion, in four general classes: *Hyperpepsia, hypopepsia, apepsia*, and *simple dyspepsia* (following the nomenclature of Hayem and Winter). Hypopepsia and hyperpepsia present respectively two and three main subdivisions, each of which, together with simple dyspepsia, is divided into two types, according as coefficient *a*, the measure of the quality of proteid digestion, is = or —. Each of these types is again subdivided in relation to fermentation, into two subclasses,—without fermentation and with fermentation. Fermentation is always **present** in apepsia. The characteristics of these several classes, subdivisions, and types are as follows:—

HYPERPEPSIA.—The characteristic feature in hyperpepsia is **A′+**. The significance of this is that the free HCl and combined chlorin (**H+C**), representing the amount of chlorin separated, are found in quantities sufficient to produce excessive acidity, there being excess of stomach work, not regarding quality. There are three subdivisions:—

1. Hyperpepsia typical, all kinds of work in excess (**A′ + H + C +**).
2. Hyperpepsia without excess of free HCl (**A′ + H** — or = **C +**).
3. Hyperpepsia without excess of combined chlorin (**A′ + H + C** — or =).

Each of the subdivisions of hyperpepsia presents two types:—

(1.) *a* =, signifying that the proteid digestion is normal in quality.
(2.) *a* —, signifying that the proteid digestion is inferior in quality, neutral chloro-organic compounds being present in excess, probably the result of proteid fermentation in the early stages of digestion.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1-30]).

HYPOPEPSIA.—The characteristic of hypopepsia is **A′**—, the significance of which is that H and C are not found in sufficient quantities to produce a normal degree of acidity; that is, the amount of chlorin separated is less than normal. There are two subdivisions of hypopepsia:—

1. Hypopepsia typical (**A′ — H** or —).
2. Hypopepsia without deficiency of free HCl (**A′ — H** = or +).

Each of the subdivisions of hypopepsia presents two types:—

(1.) *a* =, signifying that the proteid digestion is normal in quality.
(2.) *a* —, indicating the presence of neutral chloro-organic compounds from proteid fermentation.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1-30]).

APEPSIA.—In apepsia there is no normal proteid digestion. The characteristics are a neutral or very slightly acid stomach fluid (**A 0** or —); the coefficient of proteid digestion is zero (***a* 0**). There is but one class in apepsia, as fermentation is always present.

SIMPLE DYSPEPSIA.—The characteristic of simple dyspepsia is **A′** =, the significance of which is that **H** and **C** are present in sufficient quantities to produce a normal degree of acidity; that is, the amount of chlorin separated is normal. Simple dyspepsia presents two types:—

(1.) *a* =, signifying that the proteid digestion is normal in quality.
(2.) *a* —, signifying that neutral chloro-organic compounds are present from proteid fermentation.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1-30]).

For convenience in writing prescriptions these general classes are designated as follows: Hyperpepsia, Hyp.; hypopepsia, Hop.; apepsia, Ap.; simple dyspepsia, Sp.

The subdivisions under each class are designated by number as follows: Hyp. 1-1-1 would indicate a case falling under the first subdivision of hyperpepsia, of the first type (*a* =), without fermentation; Hyp. 3-2-2 would indicate a case belonging to the third subdivision of hyperpepsia, second type (*a* —), and with fermentation; Hop. 2-1-2 would indicate a case of the second division of hypopepsia, of the first type (*a* =), with fermentation; Sp. 1-2 would indicate a case of simple dyspepsia of the first type (*a* =), with fermentation.

METHOD OF INVESTIGATION.

The application of methods of precision in the investigation of disorders of digestion has revolutionized the treatment of this class of maladies. The colorimetric methods of Ewald, Boaz, and others gave only qualitative indications, and proved to be misleading and unreliable. The method of Hayem and Winter, based upon the discovery of Golding Bird, and supplemented by the recent discoveries of Toepfer, give us a complete and exact method whereby a quantitative examination of the stomach fluid may be made, with results as satisfactory as those obtained in the assaying of ores and in similar chemical researches.

Some of the symbols employed (**A, T, H, C,** ***a,*** and ***x***), are borrowed from the excellent work of Hayem and Winter, although their significance is slightly modified by the addition of the method of Toepfer, which strengthens the one weak point in the method of Hayem and Winter, namely, the impossibility of determining the amount of fatty acids present and the amount of neutral chloro-organic compounds included in **C.** Both these points are made clear by the method of Toepfer used in combination with that of Hayem and Winter, the two methods together constituting a perfect system. The determinations pertaining to salivary activity and the gastric digestion of starch, also the method for determining the capacity of the stomach, and the eight new coefficients defined (***b*** (1), ***b*** (2), ***c, m, n, y, z, k, g***), have been developed in the Laboratory of Hygiene of the Battle Creek Sanitarium, as the result of the examination and careful study of more than 15,000 stomach fluids, under the direction of the writer.

Explanation of Symbols.—The quantities which are utilized as a basis for the classification of cases in relation to proteid digestion, are **A' H, C, AC, L,** ***a, x,*** and ***g.*** The significance of these several symbols, and of other symbols employed in the computations, is explained below.

A represents the total acidity as determined by acidimetry.

A' represents the acidity indicated by the amount of free HCl and combined chlorin present (**H + C**), the combined chlorin being taken at its full value. The value of **A'** in a given case is determined by simply adding the quantities represented by **H** and **C.** This value shows the quantity of work done without reference to quality, and is the basis for the division of cases into the four great classes: *Hyperpepsia, hypopepsia, apepsia,* and *simple dyspepsia.*

T represents the total quantity of chlorin found by quantitative estimation, including free HCl (**H**), combined chlorin (**C**), and fixed chlorin or chlorin combined with bases (**F**).

H represents the quantity of free HCl found by quantitative estimation.

C represents the total amount of combined chlorin present in a given case. When the proteid digestion is normal in quality, the combined chlorin represents the same degree of acidity as a like amount of free HCl; there is likely to be present, however, a greater or smaller quantity of neutral chloro-organic compounds, which, possessing no acid value and no nutritive value, give to **C**, as determined by the estimation of chlorin, a value greater than it really possesses.

AC represents the amount of acid or normal combined chlorin, the true measure of useful work done by the stomach in the digestion of proteids. **AC** is found by a combination of the methods of Hayem and Winter and Toepfer, by the following formula: **A — (H + L) = AC.**

L represents the amount of fatty acids found present, expressed in terms of HCl.

Coefficients of Digestive Activity.—The exact mathematical data obtained by this method render possible the determination of a series of highly important coefficients whereby the physician is able to judge at a glance of the percentage degree to which any phase of the digestive process may be in divergence from the normal condition.

a, the coefficient of proteid digestion, represents the real value of the work done in the gastric digestion of proteids. It is determined by the following formula: $\frac{AC}{C \times .40} = a$, the coefficient of proteid digestion. ***a*** is simply a numerical expression of the nutritive value of the combined chlorin represented by **C,** its true acid value and its nutritive value being considered as identical. As the value of the combined chlorin is rarely found at par, the coefficient is considered to be normal when it does not fall more than 10% below par (.90 to 1.00 is considered as $a =$).

b, coefficient (1) and (2), relating to starch digestion, shows (1) the relation of the maltose or perfectly digested starch found in the stomach fluid to the dextrin and soluble carbohydrates which is imperfectly digested or converted; (2) the relation of the amount of maltose or completely digested starch to the amount found in normal digestion.

c, the coefficient of salivary activity, is a numerical expression which represents both the quantity of the saliva formed in a given time and its digestive activity as compared with normal.

x is the coefficient of fermentation. The study of a large number of stomach fluids has established the fact that by the method employed (Toepfer's) .050 grams of fatty acids (expressed as HCl) are found present in normal cases. This amount is accordingly subtracted from the amount of fatty acids (**L**) found present, and the relation to normal is shown by dividing the remainder by 50. For example: If in a given case **L** equals .100, the coefficient of acid fermentation would be as follows: $\frac{100 - 50}{50} = 1$. Each fraction of fifty is counted as one.

g, the coefficient of bacterial infection is obtained by dividing the total number of microbes per cubic centimeter by 20,000, and counting any fraction as one.

m is a coefficient of chlorin separation, showing the relation of the chlorin separated (**H + C**) to the total chlorin (**T**). The normal relation of the chlorin set free to the total chlorin (**T**) is .66.

The coefficient ***m*** is obtained by the formula $\frac{T - F}{T \times .66} = m$ or $\frac{T - F}{T} \times 1.5 = m$.

n is a coefficient of chlorin separation, showing the relation of chlorin set free (**H + C**) to the normal amount. The average amount of chlorin separated in normal digestion is .190 grams per 100 c.c. of stomach fluid. The coefficient ***n*** is determined by the following formula: $\frac{H + C}{.190} = n$.

y, the coefficient of solution obtained by comparison of the undissolved residue of the fluid with the total amount of stomach fluid obtained, is a rough means of determining the degree of digestive activity.

z is a coefficient of motility obtained by a comparison of the amount of residual fluid found in the stomach at the end of the first hour of digestion after a test meal, with the normal amount.

k is a coefficient of capacity determined by the exact measurement of the capacity of the stomach in cubic centimeters, the amount thus obtained being divided by the height of the individual in millimeters. The writer's observations have shown that there is normally one cubic centimeter of stomach capacity for each millimeter of height.

Battle Creek, Mich., Sept. 1, 1900. J. H. KELLOGG, M. D.

GRAPHIC REPRESENTATION

Of the Results of the Chemical Examination of Salivary and Gastric Digestion, Based upon the Study of over 15,000 Cases in the Physiological Laboratory of the Battle Creek (Mich.) Sanitarium.

Case of Mr B. D. Field

ARRANGED BY
J. H. KELLOGG, M. D.

	A'	A Total Acidity.	H Free HCl.	C Combined Chlorin.	AC Acid Combined Chlorin.	M Starch Digestion.	COEFFICIENTS OF DIGESTIVE WORK. Chlorin Liberation. m	n	a	Fermentation. x	Starch Digestion. b(1)	b(2)	Salivary Activity. c	Solution. y	Motility. z
HYPERPEPSIA.	.430	.480	.320	.350	.225	6.00	2.00	2.00	2.50	100	2.00	6.00	10.00	2.00	6.00
	.410	.440	.305	.320	.200	7.00	1.90	1.90	2.35	75	1.90	5.00	9.00	1.90	5.00
	.390	.410	.290	.300	.180	6.50	1.80	1.80	2.20	50	1.80	4.00	8.00	1.80	4.00
	.370	.385	.275	.285	.165	6.00	1.70	1.70	2.10	40	1.70	3.00	7.00	1.70	3.00
	.350	.360	.260	.270	.150	5.75	1.65	1.65	2.00	30	1.65	2.50	6.00	1.65	2.50
	.335	.340	.245	.255	.140	5.50	1.60	1.60	1.90	20	1.60	2.25	5.50	1.60	2.25
	.320	.320	.230	.240	.130	5.25	1.55	1.55	1.80	15	1.55	2.00	5.00	1.55	2.00
	.305	.305	.215	.225	.120	5.00	1.50	1.50	1.70	10	1.50	1.75	4.50	1.50	1.75
	.290	.290	.200	.210	.110	4.75	1.45	1.45	1.60	9	1.45	1.50	4.00	1.45	1.50
	.275	.275	.185	.195	.100	4.50	1.40	1.40	1.50	8	1.40	1.45	3.50	1.40	1.40
	.260	.260	.170	.180	.090	4.25	1.35	1.35	1.40	7	1.35	1.35	3.00	1.35	1.35
	.245	.245	.155	.165	.080	4.00	1.30	1.30	1.30	6	1.30	1.30	2.50	1.30	1.30
	.230	.230	.140	.150	.070	3.75	1.25	1.25	1.25	5	1.25	1.25	2.00	1.25	1.25
	.220	.220	.130	.140	.065	3.50	1.20	1.20	1.20	4	1.20	1.20	1.75	1.20	1.20
	.210	.210	.120	.130	.060	3.25	1.15	1.15	1.15	3	1.15	1.15	1.50	1.15	1.15
NORMAL.	.200	.200	.110	.120	.055	3.00	1.10	1.10	1.10	2	1.10	1.10	1.25	1.10	1.10
	.195	.195	.102	.112	.050	2.75	1.05	1.05	1.05	1	1.05	1.05	1.10	1.05	1.05
	.190	.190	.095	.105	.045	2.50	1.00	1.00	1.00	0	1.00	1.00	1.00	1.00	1.00
	.185	.185	.087	.098	.040	2.25	.95	.95	.95	1	.95	.95	.90	.95	.95
	.180	.180	.080	.090	.035	2.00	.90	.90	.90	2	.90	.90	.80	.90	.90
HYPOPEPSIA.	.170	.170	.075	.085	.032	1.80	.85	.85	.85	3	.85	.85	.70	.85	.85
	.160	.160	.070	.080	.030	1.60	.80	.80	.80	4	.80	.80	.60	.80	.80
	.150	.150	.065	.075	.028	1.45	.75	.75	.75	5	.75	.75	.50	.75	.75
	.140	.140	.060	.070	.026	1.30	.70	.70	.70	6	.70	.70	.40	.70	.70
	.130	.130	.055	.065	.024	1.15	.65	.65	.65	7	.65	.65	.30	.65	.65
	.120	.120	.050	.060	.022	1.00	.60	.60	.60	8	.60	.60	.25	.60	.60
	.110	.110	.045	.055	.020	.85	.55	.55	.55	9	.55	.55	.20	.55	.55
	.100	.100	.040	.050	.018	.70	.50	.50	.50	10	.50	.50	.15	.50	.50
	.085	.085	.035	.045	.016	.60	.45	.45	.45	15	.45	.45	.12	.45	.45
	.070	.070	.030	.040	.014	.50	.40	.40	.40	20	.40	.40	.10	.40	.40
	.055	.055	.025	.035	.012	.40	.35	.35	.35	30	.35	.35	.08	.35	.35
	.040	.040	.020	.030	.010	.30	.30	.30	.30	40	.30	.30	.06	.30	.30
	.025	.025	.013	.020	.007	.20	.20	.20	.20	50	.20	.20	.04	.20	.20
APEPSIA.	.010	.010	.007	.010	.004	.10	.10	.10	.10	75	.10	.10	.02	.10	.10
	.000	.000	.000	.000	.000	.00	.00	.00	.00	100	.00	.00	.00	.00	.00
							m	n	a	g	b(1)	b(2)	c	y	z

WELL DISINTEGRATED.

IMPERFECTLY DISINTEGRATED.

The figures in each of the columns of the above diagram relate to a particular quantity or quality of stomach work. The point at which the line starts indicates the class to which the case belongs, and the degree of hyperpepsia or hypopepsia, as the case may be, if the figures fall outside the normal limits.

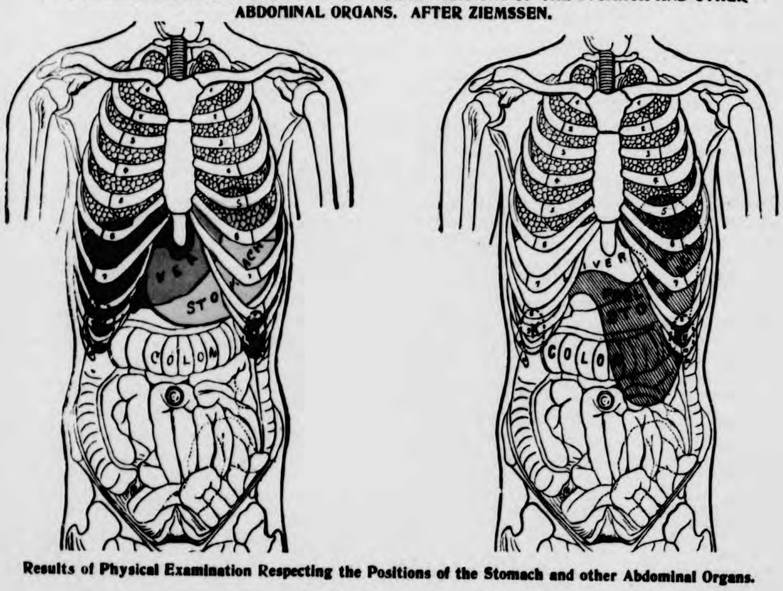
The figures found in columns headed **A'**, **A**, **H**, **C**, and **AC**, relate to the digestion of albuminoid, or proteid substances, and indicate the number of grains of chlorin in different forms found in 100 cubic centimeters of stomach fluid.

The column headed **M** relates to the salivary digestion of starch, the figures having reference to the percentage of sugar (maltose expressed as dextrose) found present in the stomach fluid.

The columns headed ***a, b, c, m, n, x, g, y,*** and ***z*** relate to the coefficients of the several kind of work done by the stomach. For explanation of the several coefficients, see preceding page.

The figures given in the several columns of this graphic diagram, represent the highest and lowest figures which have been found in the examination of over 15,000 cases.

DIAGRAMATIC REPRESENTATION OF THE NORMAL POSITIONS OF THE STOMACH AND OTHER ABDOMINAL ORGANS. AFTER ZIEMSSEN.



Results of Physical Examination Respecting the Positions of the Stomach and other Abdominal Organs.

Double lavage No. 18226

Laboratory of Hygiene of the Battle Creek Sanitarium

BATTLE CREEK, MICH.

J. H. KELLOGG, M. D., Superintendent. F. J. OTIS, M. D., Director.

Report of the Chemical and Bacteriological Examination of the Stomach Fluid Obtained after a Test Meal in the Case of

Mr. B. D. Field State Mich Date, 10/12 1902

Test Meal.— Regular ..... Time of Digestion: ..... h ..... m

Special 60 g. potatoe puree 200 c.c. water " ..... h ..... m

PHYSICAL EXAMINATION.

Amount 84 c.c. Color N

Specific Gravity ..... Odor N

Residue 8 grms. (normal 20 grms.) Blood 0

Estimated stomach contents 117 c.c. (normal 120 c.c.); Mucus {Normal / Catarrhal} N

MICROSCOPICAL EXAMINATION.

Blood ..... Misc. .....

Pus ....

BACTERIOLOGICAL EXAMINATION.

Bacteria, No. per c.c. (30 c.c. = 1 oz.) { Aerobic 0 / Anaerobic 0

Yeast " " 0

Mold " " 0

Acid formation ..... Milk coagulation 0

Gas production ..... Gelatin liquefaction 0

Bread media ..... Fruit Media 0

DIGESTION OF PROTEIDS.

	Normal quantities.			
Total acidity	(.180–.200 grms.)	A	.310	grms.
Calculated acidity	(.180–.200 ")	A'	.300	"
Total chlorine	(.300–.330 ")	T	.630	"
Free HCl	(.080–.110 ")	H	.190	"
Acid combined chlorine	(.035–.055 ")	AC	.050	"
Neutral combined chlorine	(.020–.025 ")	N	.060	"
Total combined chlorine	(.090–.120 ")	C	.110	"
Fixed Chlorides	(.100–.110 ")	F	.350	"

Proteids.— Albuminoids — Syntonin + Propeptone + Peptone 0

Ferments Pepsin + Rennet — Rennet Zymogen 0 **Bile** 0

DIGESTION OF STARCH.

Saliva, Reaction { Acid ..... / Alkaline ..... } amount in 5 m — grms. 1 c.c. converted 0.1 grms. of starch in — m.

Stomach Fluid
- **Maltose (M)** 2.142 grms.
- **Dextrin and Soluble Starch (D)** 6.956 "
- **Starch** Lugol's Sol.,— Blue, Violet, Brown, Yellow, Colorless.
- **Fatty Acids** (from fermentation) **(L)** .870 grms.
- **Lactic Acid** ..... **Acetic Acid** ..... **Butyric Acid** .....

COEFFICIENTS.

THE NORMAL COEFFICIENT IS 1.00, EXCEPT IN THE CASE OF FERMENTATION, AND BACTERIAL INFECTION IN WHICH IT IS 0.

Gastric Digestion
- **Proteids (a)** 1.13 **Fermentation (x)** 1
- **Starch (b)** (1) .29 **Bacterial Infection (g)** 0
- (2) .85 **Solution (y)** 3.5

Salivary Activity (c) — **Motility (z)** .96

Relation of Chlorine separated (H + C) to total chlorine (T) (m) .69

Relation of Chlorine separated (H + C) to normal (n) 1.57

Coefficient of Capacity (k) 1.63

Diagnosis.— Classification .....

Remarks: .....

Prescription.— .....

Classification of Functional Disorders of the Stomach

IN RELATION TO PROTEID DIGESTION

Based upon a Quantitative Chemical Examination of the Stomach Fluid Obtained after a Test Meal, in over 15,000 Analyses.

Modified from Hayem and Winter by J. H. KELLOGG, M. D.

HYPERPEPSIA. A′ + .

1. **A′ + H + C + (Typical)**..... (Both HCl and combined chlorin in excess.)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
2. **A′ + H 0, — or = C +**..... (Without excess of free HCl [H].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
3. **A′ + H + C — or =**..... (Without excess of combined chlorin [C].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

HYPOPEPSIA. A′ — .

1. **A′ — H — or 0 (Typical)**..... (All elements deficient.)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
2. **A′ — H = or +**..... (Without deficiency of HCl [H].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

APEPSIA. A 0 or — H 0 a 0 or —.

SIMPLE DYSPEPSIA. A′ = .

1. $a =$ { 1. Without fermentation (x 0) (normal). 2. With " (x +).
2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

EXPLANATION OF CLASSIFICATION.

In the study of over 15,000 stomach fluids, I have found it possible to include all cases of disorder of the chemico-vital processes of the stomach, as regards proteid digestion, in four general classes: *Hyperpepsia, hypopepsia, apepsia,* and *simple dyspepsia* (following the nomenclature of Hayem and Winter). Hypopepsia and hyperpepsia present respectively two and three main subdivisions, each of which, together with simple dyspepsia, is divided into two types, according as coefficient *a*, the measure of the quality of proteid digestion, is = or —. Each of these types is again subdivided in relation to fermentation, into two subclasses,—without fermentation and with fermentation. Fermentation is always present in apepsia. The characteristics of these several classes, subdivisions, and types are as follows:—

HYPERPEPSIA.—The characteristic feature in hyperpepsia is **A′+**. The significance of this is that the free HCl and combined chlorin (**H+C**), representing the amount of chlorin separated, are found in quantities sufficient to produce excessive acidity, there being excess of stomach work, not regarding quality. There are three subdivisions:—

1. Hyperpepsia typical, all kinds of work in excess (**A′ + H + C +**).
2. Hyperpepsia without excess of free HCl (**A′ + H** — or = **C +**).
3. Hyperpepsia without excess of combined chlorin (**A′ + H + C** — or =).

Each of the subdivisions of hyperpepsia presents two types:—

(1.) $a =$, signifying that the proteid digestion is normal in quality.
(2.) $a -$, signifying that the proteid digestion is inferior in quality, neutral chloro-organic compounds being present in excess, probably the result of proteid fermentation in the early stages of digestion.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1–30]).

HYPOPEPSIA.—The characteristic of hypopepsia is **A′**—, the significance of which is that H and C are not found in sufficient quantities to produce a normal degree of acidity; that is, the amount of chlorin separated is less than normal. There are two subdivisions of hypopepsia:—

1. Hypopepsia typical (**A′ — H** or —).
2. Hypopepsia without deficiency of free HCl (**A′ — H** = or +).

Each of the subdivisions of hypopepsia presents two types:—

(1.) $a =$, signifying that the proteid digestion is normal in quality.
(2.) $a -$, indicating the presence of neutral chloro-organic compounds from proteid fermentation.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1–30]).

APEPSIA.—In apepsia there is no normal proteid digestion. The characteristics are a neutral or very slightly acid stomach fluid (**A 0** or —); the coefficient of proteid digestion is zero (***a* 0**). There is but one class in apepsia, as fermentation is always present.

SIMPLE DYSPEPSIA.—The characteristic of simple dyspepsia is **A′** =, the significance of which is that **H** and **C** are present in sufficient quantities to produce a normal degree of acidity; that is, the amount of chlorin separated is normal. Simple dyspepsia presents two types:—

(1.) $a =$, signifying that the proteid digestion is normal in quality.
(2.) $a -$, signifying that neutral chloro-organic compounds are present from proteid fermentation.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1–30]).

For convenience in writing prescriptions these general classes are designated as follows: Hyperpepsia, Hyp.; hypopepsia, Hop.; apepsia, Ap.; simple dyspepsia, Sp.

The subdivisions under each class are designated by number as follows: Hyp. 1-1-1 would indicate a case falling under the first subdivision of hyperpepsia, of the first type ($a =$), without fermentation; Hyp. 3-2-2 would indicate a case belonging to the third subdivision of hyperpepsia, second type ($a -$), and with fermentation; Hop. 2-1-2 would indicate a case of the second division of hypopepsia, of the first type ($a =$), with fermentation; Sp. 1-2 would indicate a case of simple dyspepsia of the first type ($a =$), with fermentation.

METHOD OF INVESTIGATION.

The application of methods of precision in the investigation of disorders of digestion has revolutionized the treatment of this class of maladies. The colorimetric methods of Ewald, Boaz, and others gave only qualitative indications, and proved to be misleading and unreliable. The method of Hayem and Winter, based upon the discovery of Golding Bird, and supplemented by the recent discoveries of Toepfer, give us a complete and exact method whereby a quantitative examination of the stomach fluid may be made, with results as satisfactory as those obtained in the assaying of ores and in similar chemical researches.

Some of the symbols employed (**A, T, H, C,** ***a,*** and ***x***), are borrowed from the excellent work of Hayem and Winter, although their significance is slightly modified by the addition of the method of Toepfer, which strengthens the one weak point in the method of Hayem and Winter, namely, the impossibility of determining the amount of fatty acids present and the amount of neutral chloro-organic compounds included in **C.** Both these points are made clear by the method of Toepfer used in combination with that of Hayem and Winter, the two methods together constituting a perfect system. The determinations pertaining to salivary activity and the gastric digestion of starch, also the method for determining the capacity of the stomach, and the eight new coefficients defined (***b*** (1), ***b*** (2), ***c, m, n, y, z, k, g***), have been developed in the Laboratory of Hygiene of the Battle Creek Sanitarium, as the result of the examination and careful study of more than 15,000 stomach fluids, under the direction of the writer.

Explanation of Symbols.—The quantities which are utilized as a basis for the classification of cases in relation to proteid digestion, are **A' H, C, AC, L,** ***a, x,*** and ***g.*** The significance of these several symbols, and of other symbols employed in the computations, is explained below.

A represents the total acidity as determined by acidimetry.

A' represents the acidity indicated by the amount of free HCl and combined chlorin present (**H + C**), the combined chlorin being taken at its full value. The value of **A'** in a given case is determined by simply adding the quantities represented by **H** and **C.** This value shows the quantity of work done without reference to quality, and is the basis for the division of cases into the four great classes: *Hyperpepsia, hypopepsia, apepsia,* and *simple dyspepsia.*

T represents the total quantity of chlorin found by quantitative estimation, including free HCl (**H**), combined chlorin (**C**), and fixed chlorin or chlorin combined with bases (**F**).

H represents the quantity of free HCl found by quantitative estimation.

C represents the total amount of combined chlorin present in a given case. When the proteid digestion is normal in quality, the combined chlorin represents the same degree of acidity as a like amount of free HCl; there is likely to be present, however, a greater or smaller quantity of neutral chloro-organic compounds, which, possessing no acid value and no nutritive value, give to **C**, as determined by the estimation of chlorin, a value greater than it really possesses.

AC represents the amount of acid or normal combined chlorin, the true measure of useful work done by the stomach in the digestion of proteids. **AC** is found by a combination of the methods of Hayem and Winter and Toepfer, by the following formula: **A** — (**H** + **L**) = **AC.**

L represents the amount of fatty acids found present, expressed in terms of HCl.

Coefficients of Digestive Activity.—The exact mathematical data obtained by this method render possible the determination of a series of highly important coefficients whereby the physician is able to judge at a glance of the percentage degree to which any phase of the digestive process may be in divergence from the normal condition.

a, the coefficient of proteid digestion, represents the real value of the work done in the gastric digestion of proteids. It is determined by the following formula: $\frac{\mathbf{AC}}{\mathbf{C} \times .40} = a$, the coefficient of proteid digestion. ***a*** is simply a numerical expression of the nutritive value of the combined chlorin represented by **C,** its true acid value and its nutritive value being considered as identical. As the value of the combined chlorin is rarely found at par, the coefficient is considered to be normal when it does not fall more than 10% below par (.90 to 1.00 is considered as $a =$).

b, coefficient (1) and (2), relating to starch digestion, shows (1) the relation of the maltose or perfectly digested starch found in the stomach fluid to the dextrin and soluble carbohydrates which is imperfectly digested or converted; (2) the relation of the amount of maltose or completely digested starch to the amount found in normal digestion.

c, the coefficient of salivary activity, is a numerical expression which represents both the quantity of the saliva formed in a given time and its digestive activity as compared with normal.

x is the coefficient of fermentation. The study of a large number of stomach fluids has established the fact that by the method employed (Toepfer's) .050 grams of fatty acids (expressed as HCl) are found present in normal cases. This amount is accordingly subtracted from the amount of fatty acids (**L**) found present, and the relation to normal is shown by dividing the remainder by 50. For example: If in a given case **L** equals .100, the coefficient of acid fermentation would be as follows: $\frac{100 - 50}{50} = 1$. Each fraction of fifty is counted as one.

g, the coefficient of bacterial infection is obtained by dividing the total number of microbes per cubic centimeter by 20,000, and counting any fraction as one.

m is a coefficient of chlorin separation, showing the relation of the chlorin separated (**H + C**) to the total chlorin (**T**). The normal relation of the chlorin set free to the total chlorin (**T**) is .66.

The coefficient ***m*** is obtained by the formula $\frac{\mathbf{T} - \mathbf{F}}{\mathbf{T} \times .66} = m$ or $\frac{\mathbf{T} - \mathbf{F}}{\mathbf{T}} \times 1.5 = m$.

n is a coefficient of chlorin separation, showing the relation of chlorin set free (**H + C**) to the normal amount. The average amount of chlorin separated in normal digestion is .190 grams per 100 c.c. of stomach fluid. The coefficient ***n*** is determined by the following formula: $\frac{\mathbf{H} + \mathbf{C}}{190} = n$.

y, the coefficient of solution obtained by comparison of the undissolved residue of the fluid with the total amount of stomach fluid obtained, is a rough means of determining the degree of digestive activity.

z is a coefficient of motility obtained by a comparison of the amount of residual fluid found in the stomach at the end of the first hour of digestion after a test meal, with the normal amount.

k is a coefficient of capacity determined by the exact measurement of the capacity of the stomach in cubic centimeters, the amount thus obtained being divided by the height of the individual in millimeters. The writer's observations have shown that there is normally one cubic centimeter of stomach capacity for each millimeter of height.

Battle Creek, Mich., Sept. 1, 1900. J. H. KELLOGG, M. D.

GRAPHIC REPRESENTATION

Of the Results of the Chemical Examination of Salivary and Gastric Digestion, Based upon the Study of over 15,000 Cases in the Physiological Laboratory of the Battle Creek (Mich.) Sanitarium.

Case of *Mr. B. D. Field*

ARRANGED BY
J. H. KELLOGG, M. D.

	A'	A Total Acidity.	H Free HCl.	C Combined Chlorin.	AC Acid Combined Chlorin.	M Starch Digestion.	COEFFICIENTS OF DIGESTIVE WORK. Chlorin Liberation. m	n	a	Fermentation. x	Starch Digestion. b(1)	b(2)	c Salivary Activity.	Solution. y	Motility. z
HYPERPEPSIA.	.430	.480	.320	.350	.225	8.00	2.00	2.00	2.50	100	2.00	6.00	10.00	2.00	6.00
	.410	.440	.305	.320	.200	7.00	1.90	1.90	2.35	75	1.90	5.00	9.00	1.90	5.00
	.390	.410	.290	.300	.180	6.50	1.80	1.80	2.20	50	1.80	4.00	8.00	1.80	4.00
	.370	.385	.275	.285	.165	6.00	1.70	1.70	2.10	40	1.70	3.00	7.00	1.70	3.00
	.350	.360	.260	.270	.150	5.75	1.65	1.65	2.00	30	1.65	2.50	6.00	1.65	2.50
	.335	.340	.245	.255	.140	5.50	1.60	1.60	1.90	20	1.60	2.25	5.50	1.60	2.25
	.320	.320	.230	.240	.130	5.25	1.55	1.55	1.80	15	1.55	2.00	5.00	1.55	2.00
	.305	.305	.215	.225	.120	5.00	1.50	1.50	1.70	10	1.50	1.75	4.50	1.50	1.75
	.290	.290	.200	.210	.110	4.75	1.45	1.45	1.60	9	1.45	1.50	4.00	1.45	1.50
	.275	.275	.185	.195	.100	4.50	1.40	1.40	1.50	8	1.40	1.45	3.50	1.40	1.40
	.260	.260	.170	.180	.090	4.25	1.35	1.35	1.40	7	1.35	1.35	3.00	1.35	1.35
	.245	.245	.155	.165	.080	4.00	1.30	1.30	1.30	6	1.30	1.30	2.50	1.30	1.30
	.230	.230	.140	.150	.070	3.75	1.25	1.25	1.25	5	1.25	1.25	2.00	1.25	1.25
	.220	.220	.130	.140	.065	3.50	1.20	1.20	1.20	4	1.20	1.20	1.75	1.20	1.20
	.210	.210	.120	.130	.060	3.25	1.15	1.15	1.15	3	1.15	1.15	1.50	1.15	1.15
NORMAL.	.200	.200	.110	.120	.055	3.00	1.10	1.10	1.10	2	1.10	1.10	1.25	1.10	1.10
	.195	.195	.100	.112	.050	2.75	1.05	1.05	1.05	1	1.05	1.05	1.10	1.05	1.05
	.190	.190	.095	.105	.045	2.50	1.00	1.00	1.00	0	1.00	1.00	1.00	1.00	1.00
	.185	.185	.087	.098	.040	2.25	.95	.95	.95	1	.95	.95	.90	.95	.95
	.180	.180	.080	.090	.035	2.00	.90	.90	.90	2	.90	.90	.80	.90	.90
HYPOPEPSIA.	.170	.170	.075	.085	.032	1.80	.85	.85	.85	3	.85	.85	.70	.85	.85
	.160	.160	.070	.080	.030	1.60	.80	.80	.80	4	.80	.80	.60	.80	.80
	.150	.150	.065	.075	.028	1.45	.75	.75	.75	5	.75	.75	.50	.75	.75
	.140	.140	.060	.070	.026	1.30	.70	.70	.70	6	.70	.70	.40	.70	.70
	.130	.130	.055	.065	.024	1.15	.65	.65	.65	7	.65	.65	.30	.65	.65
	.120	.120	.050	.060	.022	1.00	.60	.60	.60	8	.60	.60	.25	.60	.60
	.110	.110	.045	.055	.020	.85	.55	.55	.55	9	.55	.55	.20	.55	.55
	.100	.100	.040	.050	.018	.70	.50	.50	.50	10	.50	.50	.15	.50	.50
	.085	.085	.035	.045	.016	.60	.45	.45	.45	15	.45	.45	.12	.45	.45
	.070	.070	.030	.040	.014	.50	.40	.40	.40	20	.40	.40	.10	.40	.40
	.055	.055	.025	.035	.012	.40	.35	.35	.35	30	.35	.35	.08	.35	.35
	.040	.040	.020	.030	.010	.30	.30	.30	.30	40	.30	.30	.06	.30	.30
	.025	.025	.013	.020	.007	.20	.20	.20	.20	50	.20	.20	.04	.20	.20
APEPSIA.	.010	.010	.007	.010	.004	.10	.10	.10	.10	75	.10	.10	.02	.10	.10
	.000	.000	.000	.000	.000	.00	.00	.00	.00	100	.00	.00	.00	.00	.00
							m	n	a	g	b(1)	b(2)	c	y	z

WELL DISINTEGRATED.

IMPERFECTLY DISINTEGRATED.

The figures in each of the columns of the above diagram relate to a particular quantity or quality of stomach work. The point at which the line starts indicates the class to which the case belongs, and the degree of hyperpepsia or hypopepsia, as the case may be, if the figures fall outside the normal limits.

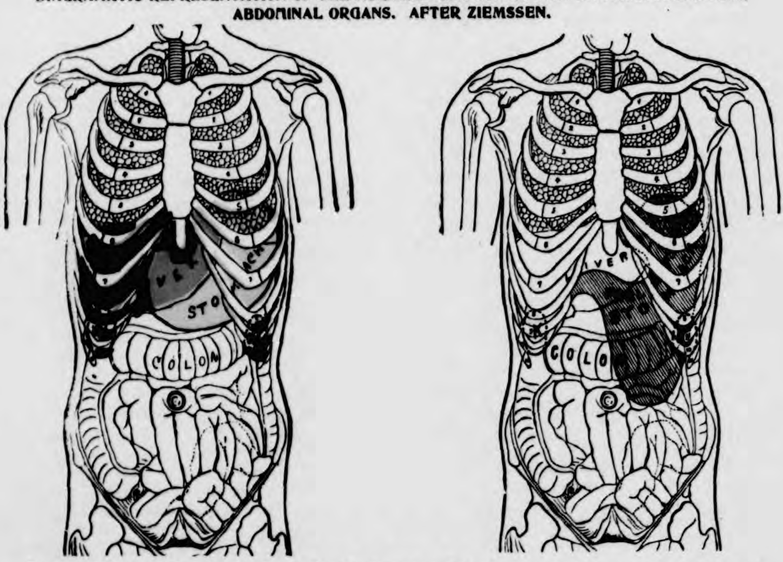
The figures found in columns headed **A', A, H, C,** and **AC,** relate to the digestion of albuminoid, or proteid substances, and indicate the number of grains of chlorin in different forms found in 100 cubic centimeters of stomach fluid.

The column headed **M** relates to the salivary digestion of starch, the figures having reference to the percentage of sugar (maltose expressed as dextrose) found present in the stomach fluid.

The columns headed ***a, b, c, m, n, x, g, y,*** and ***z*** relate to the coefficients of the several kind of work done by the stomach. For explanation of the several coefficients, see preceding page.

The figures given in the several columns of this graphic diagram, represent the highest and lowest figures which have been found in the examination of over 15,000 cases.

DIAGRAMATIC REPRESENTATION OF THE NORMAL POSITIONS OF THE STOMACH AND OTHER ABDOMINAL ORGANS. AFTER ZIEMSSEN.



Results of Physical Examination Respecting the Positions of the Stomach and other Abdominal Organs.

No. 18252

Laboratory of Hygiene of the Battle Creek Sanitarium

BATTLE CREEK, MICH.

J. H. KELLOGG, M. D., Superintendent. F. J. OTIS, M. D., Director.

Report of the Chemical and Bacteriological Examination of the Stomach Fluid Obtained after a Test Meal in the Case of

Mr. B. D. Field State Mich. Date 10-21 1902

Test Meal.— Regular 60 g potatoes puree Time of Digestion: 1 h 15 m

Special ~~7.0 g~~ peptogen 200 cc water " h m

PHYSICAL EXAMINATION.

Amount 59 c.c. Color M

Specific Gravity Odor M

Residue 15 grms. (normal 20 grms.) Blood 0

Estimated stomach contents 519 c.c. (normal 120 c.c.); Mucus { Normal / Catarrhal } —

MICROSCOPICAL EXAMINATION.

Blood Misc

Pus

BACTERIOLOGICAL EXAMINATION.

Bacteria, No. per c.c. (30 c.c. = 1 oz.) { Aerobic 0 / Anaerobic 0

Yeast " " 0

Mold " " 0

Acid formation 0 Milk coagulation 0

Gas production 0 Gelatin liquefaction 0

Bread media 0 Fruit Media 0

DIGESTION OF PROTEIDS.

	Normal quantities.			
Total acidity	(.180–.200 grms.)	**A**	.168	grms.
Calculated acidity	(.180–.200 ")	**A'**	.147	"
Total chlorine	(.300–.330 ")	**T**	.214	"
Free HCl	(.080–.110 ")	**H**	.128	"
Acid combined chlorine	(.035–.055 ")	**AC**	.008	"
Neutral combined chlorine	(.020–.025 ")	**N**	.012	"
Total combined chlorine	(.090–.120 ")	**C**	.020	"
Fixed Chlorides	(.100–.110 ")	**F**	.066	"

Proteids.— Albuminoids — Syntonin — Propeptone + Peptone 0

Ferments Pepsin 20 Rennet — Rennet Zymogen 0 **Bile** 0

DIGESTION OF STARCH.

Saliva. Reaction { Acid / Alkaline } amount in 5 m grms. 1 c.c. converted 0.1 grms. of starch in m.

no spec.

Stomach Fluid
- **Maltose (M)** 1.88 grms.
- **Dextrin and Soluble Starch (D)** 4.6 "
- **Starch** Lugol's Sol.,— Blue, Violet, Brown, Yellow, Colorless.
- **Fatty Acids** (from fermentation) (L) .032 grms.
- **Lactic Acid** **Acetic Acid** **Butyric Acid**

COEFFICIENTS.

THE NORMAL COEFFICIENT IS 1.00, EXCEPT IN THE CASE OF FERMENTATION, AND BACTERIAL INFECTION IN WHICH IT IS 0.

Gastric Digestion
- **Proteids (*a*)** 1.00 **Fermentation (*x*)** 0
- **Starch (*b*)** (1) .95 **Bacterial Infection (*g*)** 0
- (2) .95 **Solution (*y*)** .66

Salivary Activity (*c*) — **Motility (*z*)** .25

Relation of Chlorine separated (H + C) to total chlorine (T) (*m*) .03

Relation of Chlorine separated (H + C) to normal (*n*) .77

Coefficient of Capacity (*k*) .30

Diagnosis.— Classification

Remarks:

Prescription.—

Classification of Functional Disorders of the Stomach

IN RELATION TO PROTEID DIGESTION

Based upon a Quantitative Chemical Examination of the Stomach Fluid Obtained after a Test Meal, in over 15,000 Analyses.

Modified from Hayem and Winter by J. H. KELLOGG, M. D.

HYPERPEPSIA. A′ + .

1. **A′ + H + C + (Typical)**..... (Both HCl and combined chlorin in excess.)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
2. **A′ + H 0, — or = C +**..... (Without excess of free HCl [H].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
3. **A′ + H + C — or =**..... (Without excess of combined chlorin [C].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

HYPOPEPSIA. A′ — .

1. **A′ — H — or 0 (Typical)**..... (All elements deficient.)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
2. **A′ — H = or +**..... (Without deficiency of HCl [H].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

APEPSIA. A 0 or — H 0 a 0 or —.

SIMPLE DYSPEPSIA. A′ = .

1. $a =$ { 1. Without fermentation (x 0) (normal). 2. With " (x +).
2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

EXPLANATION OF CLASSIFICATION.

In the study of over 15,000 stomach fluids, I have found it possible to include all cases of disorder of the chemico-vital processes of the stomach, as regards proteid digestion, in four general classes: *Hyperpepsia, hypopepsia, apepsia,* and *simple dyspepsia* (following the nomenclature of Hayem and Winter). Hypopepsia and hyperpepsia present respectively two and three main subdivisions, each of which, together with simple dyspepsia, is divided into two types, according as coefficient a, the measure of the quality of proteid digestion, is = or —. Each of these types is again subdivided in relation to fermentation, into two subclasses,—without fermentation and with fermentation. Fermentation is always present in apepsia. The characteristics of these several classes, subdivisions, and types are as follows:—

HYPERPEPSIA.— The characteristic feature in hyperpepsia is **A′+**. The significance of this is that the free HCl and combined chlorin (**H+C**), representing the amount of chlorin separated, are found in quantities sufficient to produce excessive acidity, there being excess of stomach work, not regarding quality. There are three subdivisions:—

1. Hyperpepsia typical, all kinds of work in excess (**A′ + H + C +**).
2. Hyperpepsia without excess of free HCl (**A′ + H** — or = **C +**).
3. Hyperpepsia without excess of combined chlorin (**A′ + H + C** — or =).

Each of the subdivisions of hyperpepsia presents two types:—

(1.) $a =$, signifying that the proteid digestion is normal in quality.
(2.) $a -$, signifying that the proteid digestion is inferior in quality, neutral chloro-organic compounds being present in excess, probably the result of proteid fermentation in the early stages of digestion.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1-30]).

HYPOPEPSIA.— The characteristic of hypopepsia is **A′**—, the significance of which is that H and C are not found in sufficient quantities to produce a normal degree of acidity; that is, the amount of chlorin separated is less than normal. There are two subdivisions of hypopepsia:—

1. Hypopepsia typical (**A′ — H** or —).
2. Hypopepsia without deficiency of free HCl (**A′ — H** = or +).

Each of the subdivisions of hypopepsia presents two types:—

(1.) $a =$, signifying that the proteid digestion is normal in quality.
(2.) $a -$, indicating the presence of neutral chloro-organic compounds from proteid fermentation.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1-30]).

APEPSIA.— In apepsia there is no normal proteid digestion. The characteristics are a neutral or very slightly acid stomach fluid (**A 0** or —); the coefficient of proteid digestion is zero (***a* 0**). There is but one class in apepsia, as fermentation is always present.

SIMPLE DYSPEPSIA.— The characteristic of simple dyspepsia is **A′** =, the significance of which is that **H** and **C** are present in sufficient quantities to produce a normal degree of acidity; that is, the amount of chlorin separated is normal. Simple dyspepsia presents two types:—

(1.) $a =$, signifying that the proteid digestion is normal in quality.
(2.) $a -$, signifying that neutral chloro-organic compounds are present from proteid fermentation.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1-30]).

For convenience in writing prescriptions these general classes are designated as follows: Hyperpepsia, Hyp.; hypopepsia, Hop.; apepsia, Ap.; simple dyspepsia, Sp.

The subdivisions under each class are designated by number as follows: Hyp. 1-1-1 would indicate a case falling under the first subdivision of hyperpepsia, of the first type ($a =$), without fermentation; Hyp. 3-2-2 would indicate a case belonging to the third subdivision of hyperpepsia, second type ($a -$), and with fermentation; Hop. 2-1-2 would indicate a case of the second division of hypopepsia, of the first type ($a =$), with fermentation; Sp. 1-2 would indicate a case of simple dyspepsia of the first type ($a =$), with fermentation.

METHOD OF INVESTIGATION.

The application of methods of precision in the investigation of disorders of digestion has revolutionized the treatment of this class of maladies. The colorimetric methods of Ewald, Boaz, and others gave only qualitative indications, and proved to be misleading and unreliable. The method of Hayem and Winter, based upon the discovery of Golding Bird, and supplemented by the recent discoveries of Toepfer, give us a complete and exact method whereby a quantitative examination of the stomach fluid may be made, with results as satisfactory as those obtained in the assaying of ores and in similar chemical researches.

Some of the symbols employed (**A, T, H, C,** ***a,*** and ***x***), are borrowed from the excellent work of Hayem and Winter, although their significance is slightly modified by the addition of the method of Toepfer, which strengthens the one weak point in the method of Hayem and Winter, namely, the impossibility of determining the amount of fatty acids present and the amount of neutral chloro-organic compounds included in **C.** Both these points are made clear by the method of Toepfer used in combination with that of Hayem and Winter, the two methods together constituting a perfect system. The determinations pertaining to salivary activity and the gastric digestion of starch, also the method for determining the capacity of the stomach, and the eight new coefficients defined ($b^{(1)}$, $b^{(2)}$, ***c, m, n, y, z, k, g***), have been developed in the Laboratory of Hygiene of the Battle Creek Sanitarium, as the result of the examination and careful study of more than 15,000 stomach fluids, under the direction of the writer.

Explanation of Symbols.— The quantities which are utilized as a basis for the classification of cases in relation to proteid digestion, are **A' H, C, AC, L,** ***a, x,*** and ***g.*** The significance of these several symbols, and of other symbols employed in the computations, is explained below.

A represents the total acidity as determined by acidimetry.

A' represents the acidity indicated by the amount of free HCl and combined chlorin present (**H + C**), the combined chlorin being taken at its full value. The value of **A'** in a given case is determined by simply adding the quantities represented by **H** and **C.** This value shows the quantity of work done without reference to quality, and is the basis for the division of cases into the four great classes: *Hyperpepsia, hypopepsia, apepsia,* and *simple dyspepsia.*

T represents the total quantity of chlorin found by quantitative estimation, including free HCl (**H**), combined chlorin (**C**), and fixed chlorin or chlorin combined with bases (**F**).

H represents the quantity of free HCl found by quantitative estimation.

C represents the total amount of combined chlorin present in a given case. When the proteid digestion is normal in quality, the combined chlorin represents the same degree of acidity as a like amount of free HCl; there is likely to be present, however, a greater or smaller quantity of neutral chloro-organic compounds, which, possessing no acid value and no nutritive value, give to **C,** as determined by the estimation of chlorin, a value greater than it really possesses.

AC represents the amount of acid or normal combined chlorin, the true measure of useful work done by the stomach in the digestion of proteids. **AC** is found by a combination of the methods of Hayem and Winter and Toepfer, by the following formula: $\mathbf{A} - (\mathbf{H} + \mathbf{L}) = \mathbf{AC}$.

L represents the amount of fatty acids found present, expressed in terms of HCl.

Coefficients of Digestive Activity.— The exact mathematical data obtained by this method render possible the determination of a series of highly important coefficients whereby the physician is able to judge at a glance of the percentage degree to which any phase of the digestive process may be in divergence from the normal condition.

a, the coefficient of proteid digestion, represents the real value of the work done in the gastric digestion of proteids. It is determined by the following formula: $\frac{\mathbf{AC}}{\mathbf{C} \times .40} = a$, the coefficient of proteid digestion. ***a*** is simply a numerical expression of the nutritive value of the combined chlorin represented by **C,** its true acid value and its nutritive value being considered as identical. As the value of the combined chlorin is rarely found at par, the coefficient is considered to be normal when it does not fall more than 10% below par (.90 to 1.00 is considered as $a =$).

b, coefficient (1) and (2), relating to starch digestion, shows (1) the relation of the maltose or perfectly digested starch found in the stomach fluid to the dextrin and soluble carbohydrates which is imperfectly digested or converted; (2) the relation of the amount of maltose or completely digested starch to the amount found in normal digestion.

c, the coefficient of salivary activity, is a numerical expression which represents both the quantity of the saliva formed in a given time and its digestive activity as compared with normal.

x is the coefficient of fermentation. The study of a large number of stomach fluids has established the fact that by the method employed (Toepfer's) .050 grams of fatty acids (expressed as HCl) are found present in normal cases. This amount is accordingly subtracted from the amount of fatty acids (**L**) found present, and the relation to normal is shown by dividing the remainder by 50. For example: If in a given case **L** equals .100, the coefficient of acid fermentation would be as follows: $\frac{100 - .50}{50} = 1$. Each fraction of fifty is counted as one.

g, the coefficient of bacterial infection is obtained by dividing the total number of microbes per cubic centimeter by 20,000, and counting any fraction as one.

m is a coefficient of chlorin separation, showing the relation of the chlorin separated (**H + C**) to the total chlorin (**T**). The normal relation of the chlorin set free to the total chlorin (**T**) is .66.

The coefficient ***m*** is obtained by the formula $\frac{\mathbf{T} - \mathbf{F}}{\mathbf{T} \times .66} = m$ or $\frac{\mathbf{T} - \mathbf{F}}{\mathbf{T}} \times 1.5 = m$.

n is a coefficient of chlorin separation, showing the relation of chlorin set free (**H + C**) to the normal amount. The average amount of chlorin separated in normal digestion is .190 grams per 100 c.c. of stomach fluid. The coefficient ***n*** is determined by the following formula: $\frac{\mathbf{H} + \mathbf{C}}{.190} = n$.

y, the coefficient of solution obtained by comparison of the undissolved residue of the fluid with the total amount of stomach fluid obtained, is a rough means of determining the degree of digestive activity.

z is a coefficient of motility obtained by a comparison of the amount of residual fluid found in the stomach at the end of the first hour of digestion after a test meal, with the normal amount.

k is a coefficient of capacity determined by the exact measurement of the capacity of the stomach in cubic centimeters, the amount thus obtained being divided by the height of the individual in millimeters. The writer's observations have shown that there is normally one cubic centimeter of stomach capacity for each millimeter of height.

Battle Creek, Mich., Sept. 1, 1900. J. H. KELLOGG, M. D.

GRAPHIC REPRESENTATION

Of the Results of the Chemical Examination of Salivary and Gastric Digestion, Based upon the Study of over 15,000 Cases in the Physiological Laboratory of the Battle Creek (Mich.) Sanitarium.

Case of *Mr. B. S. Field*

ARRANGED BY
J. H. KELLOGG, M. D.

	A'	A Total Acidity.	H Free HCl.	C Combined Chlorin.	AC Acid Combined Chlorin.	M Starch Digestion.	COEFFICIENTS OF DIGESTIVE WORK. Chlorin Liberation. m	n	a	Fermentation. x	Starch Digestion. b(1)	b(2)	c Salivary Activity.	y Solution.	z Motility.
HYPERPEPSIA.	.430	.480	.320	.350	.225	8.00	2.00	2.00	2.50	100	2.00	6.00	10.00	2.00	6.00
	.410	.440	.305	.320	.200	7.00	1.90	1.90	2.35	75	1.90	5.00	9.00	1.90	5.00
	.390	.410	.290	.300	.180	6.50	1.80	1.80	2.20	50	1.80	4.00	8.00	1.80	4.00
	.370	.385	.275	.285	.165	6.00	1.70	1.70	2.10	40	1.70	3.00	7.00	1.70	3.00
	.350	.360	.260	.270	.150	5.75	1.65	1.65	2.00	30	1.65	2.50	6.00	1.65	2.50
	.335	.340	.245	.255	.140	5.50	1.60	1.60	1.90	20	1.60	2.25	5.50	1.60	2.25
	.320	.320	.230	.240	.130	5.25	1.55	1.55	1.80	15	1.55	2.00	5.00	1.55	2.00
	.305	.305	.215	.225	.120	5.00	1.50	1.50	1.70	10	1.50	1.75	4.50	1.50	1.75
	.290	.290	.200	.210	.110	4.75	1.45	1.45	1.60	9	1.45	1.50	4.00	1.45	1.50
	.275	.275	.185	.195	.100	4.50	1.40	1.40	1.50	8	1.40	1.45	3.50	1.40	1.40
	.260	.260	.170	.180	.090	4.25	1.35	1.35	1.40	7	1.35	1.35	3.00	1.35	1.35
	.245	.245	.155	.165	.080	4.00	1.30	1.30	1.30	6	1.30	1.30	2.50	1.30	1.30
	.230	.230	.140	.150	.070	3.75	1.25	1.25	1.25	5	1.25	1.25	2.00	1.25	1.25
	.220	.220	.130	.140	.065	3.50	1.20	1.20	1.20	4	1.20	1.20	1.75	1.20	1.20
	.210	.210	.120	.130	.060	3.25	1.15	1.15	1.15	3	1.15	1.15	1.50	1.15	1.15
NORMAL.	[illegible]	[illegible]	[illegible]	.120	.055	[illegible]	1.10	1.10	1.10	2	1.10	1.10	1.25	1.10	1.10
	.195	[illegible]	[illegible]	.112	.050	2.75	1.05	1.05	1.05	1	1.05	1.05	1.10	1.05	1.05
	.190	.190	.095	.105	.045	2.50	1.00	1.00	[illegible]	[illegible]	1.00	1.00	1.00	1.00	[illegible]
	.185	.185	.087	.098	.040	[illegible]	.95	.95	.95	1	.95	.95	.90	.95	.95
	.180	.180	[illegible]	[illegible]	.035	[illegible]	.90	.90	.90	2	.90	.90	.80	.90	.90
HYPOPEPSIA.	.170	.170	.075	.085	.032	1.80	.85	.85	.85	3	.85	.85	.70	.85	.85
	.160	.160	.070	.080	.030	1.60	.80	.80	.80	4	.80	.80	.60	.80	.80
	.150	.150	.065	.075	.028	1.45	.75	.75	.75	5	.75	.75	.50	.75	.75
	.140	.140	.060	.070	.026	1.30	.70	.70	.70	6	.70	.70	.40	.70	.70
	.130	.130	.055	.065	.024	1.15	.65	.65	.65	7	.65	.65	.30	.65	.65
	.120	.120	.050	.060	.022	1.00	.60	.60	.60	8	.60	.60	.25	.60	.60
	.110	.110	.045	.055	.020	.85	.55	.55	.55	9	.55	.55	.20	.55	.55
	.100	.100	.040	.050	.018	.70	.50	.50	.50	10	.50	.50	.15	.50	.50
	.085	.085	.035	.045	.016	.60	.45	.45	.45	15	.45	.45	.12	.45	.45
	.070	.070	.030	.040	.014	.50	.40	.40	.40	20	.40	.40	.10	.40	.40
	.055	.055	.025	.035	.012	.40	.35	.35	.35	30	.35	.35	.08	.35	.35
	.040	.040	.020	.030	.010	.30	.30	.30	.30	40	.30	.30	.06	.30	.30
	.025	.025	.013	.020	.007	.20	.20	.20	.20	50	.20	.20	.04	.20	.20
	.010	.010	.007	.010	.004	.10	.10	.10	.10	75	.10	.10	.02	.10	.10
APEPSIA.	.000	.000	.000	.000	.000	.00	.00	.00	.00	100	.00	.00	.00	.00	.00
							m	n	a	g	b(1)	b(2)	c	y	z

WELL DISINTEGRATED.

IMPERFECTLY DISINTEGRATED.

The figures in each of the columns of the above diagram relate to a particular quantity or quality of stomach work. The point at which the line starts indicates the class to which the case belongs, and the degree of hyperpepsia or hypopepsia, as the case may be, if the figures fall outside the normal limits.

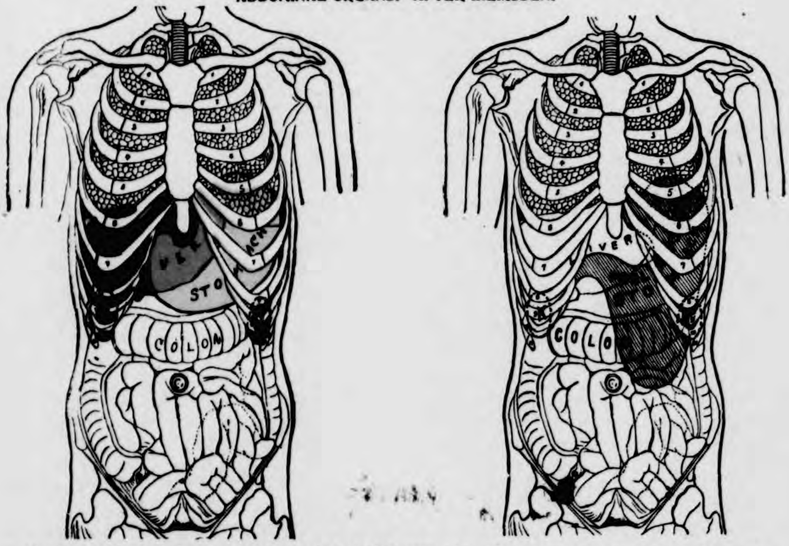
The figures found in columns headed **A', A, H, C,** and **AC,** relate to the digestion of albuminoid, or proteid substances, and indicate the number of grains of chlorin in different forms found in 100 cubic centimeters of stomach fluid.

The column headed ***M*** relates to the salivary digestion of starch, the figures having reference to the percentage of sugar (maltose expressed as dextrose) found present in the stomach fluid.

The columns headed ***a, b, c, m, n, x, g, y,*** and ***z*** relate to the coefficients of the several kind of work done by the stomach. For explanation of the several coefficients, see preceding page.

The figures given in the several columns of this graphic diagram, represent the highest and lowest figures which have been found in the examination of over 15,000 cases.

DIAGRAMATIC REPRESENTATION OF THE NORMAL POSITIONS OF THE STOMACH AND OTHER ABDOMINAL ORGANS. AFTER ZIEMSSEN.



Results of Physical Examination Respecting the Positions of the Stomach and other Abdominal Organs.

No. 18260

Laboratory of Hygiene of the Battle Creek Sanitarium

BATTLE CREEK, MICH.

J. H. KELLOGG, M. D., Superintendent. F. J. OTIS, M. D., Director.

Report of the Chemical and Bacteriological Examination of the Stomach Fluid Obtained after a Test Meal in the Case of

M. B. D. Field State Mich. Date 10-22 190 2

Test Meal.— Regular ..... Time of Digestion: ..... h N ... m

Special. 60 g. potatoe 60 g. "peptogen" not H2O " ..... h N ... m

PHYSICAL EXAMINATION.

Amount 125 c.c. Color yellow

Specific Gravity ..... Odor M

Residue 49 grms. (normal 20 grms.) Blood 0

Estimated stomach contents 159 c.c. (normal 120 c.c.); Mucus { Normal — / Catarrhal ..... }

MICROSCOPICAL EXAMINATION.

Blood ..... Misc. .....

Pus ....

BACTERIOLOGICAL EXAMINATION.

Bacteria, No. per c.c. (30 c.c. = 1 oz.) { Aerobic 0 / Anaerobic 0 }

Yeast " " 0

Mold " " 0

Acid formation 0 Milk coagulation 0

Gas production 0 Gelatin liquefaction 0

Bread media 0 Fruit Media 0

DIGESTION OF PROTEIDS.

	Normal quantities.			
Total acidity	(.180–.200 grms.)	A	.366	grms.
Calculated acidity	(.180–.200 ")	A'	.306	"
Total chlorine	(.300–.330 ")	T	.432	"
Free HCl	(.080–.110 ")	H	.168	"
Acid combined chlorine	(.035–.055 ")	AC	.110	"
Neutral combined chlorine	(.020–.025 ")	N	.028	"
Total combined chlorine	(.090–.120 ")	C	.138	"
Fixed Chlorides	(.100–.110 ")	F	.126	"

Proteids.— Albuminoids — Syntonin — Propeptone + Peptone 0

Ferments Pepsin .17 Rennet + Rennet Zymogen — **Bile** 0

DIGESTION OF STARCH.

Saliva, Reaction { Acid ..... / Alkaline ..... } amount in 5 m ..... grms. 1 c.c. converted 0.1 grms. of starch in ..... m.

no. spec.

Stomach Fluid

- **Maltose (M)** .228 grms.
- **Dextrin and Soluble Starch (D)** 6.110 "
- **Starch** Lugol's Sol.,— Blue, Violet, Brown, Yellow, Colorless.
- **Fatty Acids** (from fermentation) (L) .086 grms.
- **Lactic Acid** ..... **Acetic Acid** ..... **Butyric Acid** .....

COEFFICIENTS.

THE NORMAL COEFFICIENT IS 1.00, EXCEPT IN THE CASE OF FERMENTATION, AND BACTERIAL INFECTION IN WHICH IT IS 0.

Gastric Digestion
- **Proteids (a)** 2.00 — **Fermentation (x)** 1.
- **Starch (b)** (1) .67 — **Bacterial Infection (g)** 0
- (2) 2.89 — **Solution (y)** .83

Salivary Activity (c) — — **Motility (z)** .75

Relation of Chlorine separated (H + C) to total chlorine (T) (m) .96

Relation of Chlorine separated (H + C) to normal (n) 1.11

Coefficient of Capacity (k) n2 1.48

Diagnosis.— Classification .....

Remarks: .....

Prescription.— .....

Classification of Functional Disorders of the Stomach

IN RELATION TO PROTEID DIGESTION

Based upon a Quantitative Chemical Examination of the Stomach Fluid Obtained after a Test Meal, in over 15,000 Analyses.

Modified from Hayem and Winter by J. H. KELLOGG, M. D.

HYPERPEPSIA. A′ + .

1. **A′ + H + C + (Typical)** ..... (Both HCl and combined chlorin in excess.)
   - $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
2. **A′ + H 0, — or = C +** ..... (Without excess of free HCl [H].)
   - $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
3. **A′ + H + C — or =** ..... (Without excess of combined chlorin [C].)
   - $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

HYPOPEPSIA. A′ — .

1. **A′ — H — or 0 (Typical)** ..... (All elements deficient.)
   - $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - $a -$ { 1. Without fermentation (x 0). 2. With " (x +).
2. **A′ — H = or +** ..... (Without deficiency of HCl [H].)
   - $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

APEPSIA. A 0 or — H 0 a 0 or —.

SIMPLE DYSPEPSIA. A′ = .

1. $a =$ { 1. Without fermentation (x 0) (normal). 2. With " (x +).
2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

EXPLANATION OF CLASSIFICATION.

In the study of over 15,000 stomach fluids, I have found it possible to include all cases of disorder of the chemico-vital processes of the stomach, as regards proteid digestion, in four general classes: *Hyperpepsia, hypopepsia, apepsia*, and *simple dyspepsia* (following the nomenclature of Hayem and Winter). Hypopepsia and hyperpepsia present respectively two and three main subdivisions, each of which, together with simple dyspepsia, is divided into two types, according as coefficient *a*, the measure of the quality of proteid digestion, is = or —. Each of these types is again subdivided in relation to fermentation, into two subclasses,—without fermentation and with fermentation. Fermentation is always present in apepsia. The characteristics of these several classes, subdivisions, and types are as follows:—

HYPERPEPSIA.— The characteristic feature in hyperpepsia is **A′+**. The significance of this is that the free HCl and combined chlorin (**H+C**), representing the amount of chlorin separated, are found in quantities sufficient to produce excessive acidity, there being excess of stomach work, not regarding quality. There are three subdivisions:—

1. Hyperpepsia typical, all kinds of work in excess (**A′ + H + C +**).
2. Hyperpepsia without excess of free HCl (**A′ + H** — or = **C +**).
3. Hyperpepsia without excess of combined chlorin (**A′ + H + C** — or =).

Each of the subdivisions of hyperpepsia presents two types:—

(1.) *a* =, signifying that the proteid digestion is normal in quality.
(2.) *a* —, signifying that the proteid digestion is inferior in quality, neutral chloro-organic compounds being present in excess, probably the result of proteid fermentation in the early stages of digestion.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1-30]).

HYPOPEPSIA.— The characteristic of hypopepsia is **A′**—, the significance of which is that H and C are not found in sufficient quantities to produce a normal degree of acidity; that is, the amount of chlorin separated is less than normal. There are two subdivisions of hypopepsia:—

1. Hypopepsia typical (**A′ — H** or —).
2. Hypopepsia without deficiency of free HCl (**A′ — H** = or +).

Each of the subdivisions of hypopepsia presents two types:—

(1.) *a* =, signifying that the proteid digestion is normal in quality.
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[1.] Without fermentation (x 0).
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APEPSIA.— In apepsia there is no normal proteid digestion. The characteristics are a neutral or very slightly acid stomach fluid (**A 0** or —); the coefficient of proteid digestion is zero (***a* 0**). There is but one class in apepsia, as fermentation is always present.

SIMPLE DYSPEPSIA.— The characteristic of simple dyspepsia is **A′** =, the significance of which is that **H** and **C** are present in sufficient quantities to produce a normal degree of acidity; that is, the amount of chlorin separated is normal. Simple dyspepsia presents two types:—

(1.) *a* =, signifying that the proteid digestion is normal in quality.
(2.) *a* —, signifying that neutral chloro-organic compounds are present from proteid fermentation.

Each type is subdivided, with reference to fermentation, into two classes:—

[1.] Without fermentation (x 0).
[2.] With fermentation (x + [1-30]).

For convenience in writing prescriptions these general classes are designated as follows: Hyperpepsia, Hyp.; hypopepsia, Hop.; apepsia, Ap.; simple dyspepsia, Sp.

The subdivisions under each class are designated by number as follows: Hyp. 1-1-1 would indicate a case falling under the first subdivision of hyperpepsia, of the first type (*a* =), without fermentation; Hyp. 3-2-2 would indicate a case belonging to the third subdivision of hyperpepsia, second type (*a* —), and with fermentation; Hop. 2-1-2 would indicate a case of the second division of hypopepsia, of the first type (*a* =), with fermentation; Sp. 1-2 would indicate a case of simple dyspepsia of the first type (*a* =), with fermentation.

METHOD OF INVESTIGATION.

The application of methods of precision in the investigation of disorders of digestion has revolutionized the treatment of this class of maladies. The colorimetric methods of Ewald, Boaz, and others gave only qualitative indications, and proved to be misleading and unreliable. The method of Hayem and Winter, based upon the discovery of Golding Bird, and supplemented by the recent discoveries of Toepfer, give us a complete and exact method whereby a quantitative examination of the stomach fluid may be made, with results as satisfactory as those obtained in the assaying of ores and in similar chemical researches.

Some of the symbols employed (**A, T, H, C,** ***a,*** and ***x***), are borrowed from the excellent work of Hayem and Winter, although their significance is slightly modified by the addition of the method of Toepfer, which strengthens the one weak point in the method of Hayem and Winter, namely, the impossibility of determining the amount of fatty acids present and the amount of neutral chloro-organic compounds included in **C.** Both these points are made clear by the method of Toepfer used in combination with that of Hayem and Winter, the two methods together constituting a perfect system. The determinations pertaining to salivary activity and the gastric digestion of starch, also the method for determining the capacity of the stomach, and the eight new coefficients defined (***b*** (1), ***b*** (2), ***c, m, n, y, z, k, g***), have been developed in the Laboratory of Hygiene of the Battle Creek Sanitarium, as the result of the examination and careful study of more than 15,000 stomach fluids, under the direction of the writer.

Explanation of Symbols.— The quantities which are utilized as a basis for the classification of cases in relation to proteid digestion, are **A′ H, C, AC, L,** ***a, x,*** and ***g.*** The significance of these several symbols, and of other symbols employed in the computations, is explained below.

A represents the total acidity as determined by acidimetry.

A′ represents the acidity indicated by the amount of free HCl and combined chlorin present (**H + C**), the combined chlorin being taken at its full value. The value of **A′** in a given case is determined by simply adding the quantities represented by **H** and **C.** This value shows the quantity of work done without reference to quality, and is the basis for the division of cases into the four great classes: *Hyperpepsia, hypopepsia, apepsia,* and *simple dyspepsia.*

T represents the total quantity of chlorin found by quantitative estimation, including free HCl (**H**), combined chlorin (**C**), and fixed chlorin or chlorin combined with bases (**F**).

H represents the quantity of free HCl found by quantitative estimation.

C represents the total amount of combined chlorin present in a given case. When the proteid digestion is normal in quality, the combined chlorin represents the same degree of acidity as a like amount of free HCl; there is likely to be present, however, a greater or smaller quantity of neutral chloro-organic compounds, which, possessing no acid value and no nutritive value, give to **C**, as determined by the estimation of chlorin, a value greater than it really possesses.

AC represents the amount of acid or normal combined chlorin, the true measure of useful work done by the stomach in the digestion of proteids. **AC** is found by a combination of the methods of Hayem and Winter and Toepfer, by the following formula: **A − (H + L) = AC.**

L represents the amount of fatty acids found present, expressed in terms of HCl.

Coefficients of Digestive Activity.— The exact mathematical data obtained by this method render possible the determination of a series of highly important coefficients whereby the physician is able to judge at a glance of the percentage degree to which any phase of the digestive process may be in divergence from the normal condition.

a, the coefficient of proteid digestion, represents the real value of the work done in the gastric digestion of proteids. It is determined by the following formula: $\frac{AC}{C \times .40} = a$, the coefficient of proteid digestion. ***a*** is simply a numerical expression of the nutritive value of the combined chlorin represented by **C,** its true acid value and its nutritive value being considered as identical. As the value of the combined chlorin is rarely found at par, the coefficient is considered to be normal when it does not fall more than 10% below par (.90 to 1.00 is considered as $a =$).

b, coefficient (1) and (2), relating to starch digestion, shows (1) the relation of the maltose or perfectly digested starch found in the stomach fluid to the dextrin and soluble carbohydrates which is imperfectly digested or converted; (2) the relation of the amount of maltose or completely digested starch to the amount found in normal digestion.

c, the coefficient of salivary activity, is a numerical expression which represents both the quantity of the saliva formed in a given time and its digestive activity as compared with normal.

x is the coefficient of fermentation. The study of a large number of stomach fluids has established the fact that by the method employed (Toepfer's) .050 grams of fatty acids (expressed as HCl) are found present in normal cases. This amount is accordingly subtracted from the amount of fatty acids (**L**) found present, and the relation to normal is shown by dividing the remainder by 50. For example: If in a given case **L** equals .100, the coefficient of acid fermentation would be as follows: $\frac{100 - 50}{50} = 1$. Each fraction of fifty is counted as one.

g, the coefficient of bacterial infection is obtained by dividing the total number of microbes per cubic centimeter by 20,000, and counting any fraction as one.

m is a coefficient of chlorin separation, showing the relation of the chlorin separated (**H + C**) to the total chlorin (**T**). The normal relation of the chlorin set free to the total chlorin (**T**) is .66.

The coefficient ***m*** is obtained by the formula $\frac{T - F}{T \times .66} = m$ or $\frac{T - F}{T} \times 1.5 = m$.

n is a coefficient of chlorin separation, showing the relation of chlorin set free (**H + C**) to the normal amount. The average amount of chlorin separated in normal digestion is .190 grams per 100 c.c. of stomach fluid. The coefficient ***n*** is determined by the following formula: $\frac{H + C}{190} = n$.

y, the coefficient of solution obtained by comparison of the undissolved residue of the fluid with the total amount of stomach fluid obtained, is a rough means of determining the degree of digestive activity.

z is a coefficient of motility obtained by a comparison of the amount of residual fluid found in the stomach at the end of the first hour of digestion after a test meal, with the normal amount.

k is a coefficient of capacity determined by the exact measurement of the capacity of the stomach in cubic centimeters, the amount thus obtained being divided by the height of the individual in millimeters. The writer's observations have shown that there is normally one cubic centimeter of stomach capacity for each millimeter of height.

Battle Creek, Mich., Sept. 1, 1900. J. H. KELLOGG, M. D.

GRAPHIC REPRESENTATION

Of the Results of the Chemical Examination of Salivary and Gastric Digestion, Based upon the Study of over 15,000 Cases in the Physiological Laboratory of the Battle Creek (Mich.) Sanitarium.

Case of *B. D. Field*

ARRANGED BY
J. H. KELLOGG, M. D.

	A'	A Total Acidity.	H Free HCl.	C Combined Chlorin.	AC Acid Combined Chlorin.	M Starch Digestion.	COEFFICIENTS OF DIGESTIVE WORK. Chlorin Liberation. m	n	a	Fermentation. x	Starch Digestion. b(1)	b(2)	Salivary Activity. c	Solution. y	Motility. z
HYPERPEPSIA.	.480	.480	.320	.350	.225	8.00	2.00	2.00	2.50	100	2.00	6.00	10.00	2.00	6.00
	.410	.440	.305	.320	.200	7.00	1.90	1.90	2.35	75	1.90	5.00	9.00	1.90	5.00
	.390	.410	.290	.300	.180	6.50	1.80	1.80	2.20	50	1.80	4.00	8.00	1.80	4.00
	.370	.385	.275	.285	.165	6.00	1.70	1.70	2.10	40	1.70	3.00	7.00	1.70	3.00
	.350	.360	.260	.270	.150	5.75	1.65	1.65	2.00	30	1.65	2.50	6.00	1.65	2.50
	.335	.340	.245	.255	.140	5.50	1.60	1.60	1.90	20	1.60	2.25	5.50	1.60	2.25
	.320	.320	.230	.240	.130	5.25	1.55	1.55	1.80	15	1.55	2.00	5.00	1.55	2.00
	.305	.305	.215	.225	.120	5.00	1.50	1.50	1.70	10	1.50	1.75	4.50	1.50	1.75
	.290	.290	.200	.210	.110	4.75	1.45	1.45	1.60	9	1.45	1.50	4.00	1.45	1.50
	.275	.275	.185	.195	.100	4.50	1.40	1.40	1.50	8	1.40	1.45	3.50	1.40	1.40
	.260	.260	.170	.180	.090	4.25	1.35	1.35	1.40	7	1.35	1.35	3.00	1.35	1.35
	.245	.245	.155	.165	.080	4.00	1.30	1.30	1.30	6	1.30	1.30	2.50	1.30	1.30
	.230	.230	.140	.150	.070	3.75	1.25	1.25	1.25	5	1.25	1.25	2.00	1.25	1.25
	.220	.220	.130	.140	.065	3.50	1.20	1.20	1.20	4	1.20	1.20	1.75	1.20	1.20
	.210	.210	.120	.130	.060	3.25	1.15	1.15	1.15	3	1.15	1.15	1.50	1.15	1.15
NORMAL.	[illegible]	.200	.110	.120	.055	3.00	1.10	1.10	1.10	2	1.10	1.10	1.25	1.10	1.10
	.195	.195	.105	.112	.050	2.75	1.05	1.05	1.05	1	1.05	1.05	1.10	1.05	1.05
	.190	.190	.095	.105	.045	2.50	1.00	1.00	1.00	[illegible]	1.00	1.00	1.00	1.00	[illegible]
	.185	.185	.087	.098	.040	2.25	.95	.95	.95	1	.95	.95	.90	.95	.95
	.180	.180	.080	.090	.035	2.00	.90	.90	.90	2	.90	.90	.80	.90	.90
HYPOPEPSIA.	.170	.170	.075	.085	.032	1.80	.85	.85	.85	3	.85	.85	.70	.85	.85
	.160	.160	.070	.080	.030	1.60	.80	.80	.80	4	.80	.80	.60	.80	.80
	.150	.150	.065	.075	.028	1.45	.75	.75	.75	5	.75	.75	.50	.75	.75
	.140	.140	.060	.070	.026	1.30	.70	.70	.70	6	.70	.70	.40	.70	.70
	.130	.130	.055	.065	.024	1.15	.65	.65	.65	7	.65	.65	.30	.65	.65
	.120	.120	.050	.060	.022	1.00	.60	.60	.60	8	.60	.60	.25	.60	.60
	.110	.110	.045	.055	.020	.85	.55	.55	.55	9	.55	.55	.20	.55	.55
	.100	.100	.040	.050	.018	.70	.50	.50	.50	10	.50	.50	.15	.50	.50
	.085	.085	.035	.045	.016	.60	.45	.45	.45	15	.45	.45	.12	.45	.45
	.070	.070	.030	.040	.014	.50	.40	.40	.40	20	.40	.40	.10	.40	.40
	.055	.055	.025	.035	.012	.40	.35	.35	.35	30	.35	.35	.08	.35	.35
	.040	.040	.020	.030	.010	.30	.30	.30	.30	40	.30	.30	.06	.30	.30
	.025	.025	.018	.020	.007	.20	.20	.20	.20	50	.20	.20	.04	.20	.20
	.010	.010	.007	.010	.004	.10	.10	.10	.10	75	.10	.10	.02	.10	.10
ANEPIL.	.000	.000	.000	.000	.000	.00	.00	.00	.00	100	.00	.00	.00	.00	.00
							m	n	a	g	b(1)	b(2)	c	y	z

WELL DISINTEGRATED.

IMPERFECTLY DISINTEGRATED.

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The figures in each of the columns of the above diagram relate to a particular quantity or quality of stomach work. The point at which the line starts indicates the class to which the case belongs, and the degree of hyperpepsia or hypopepsia, as the case may be, if the figures fall outside the normal limits.

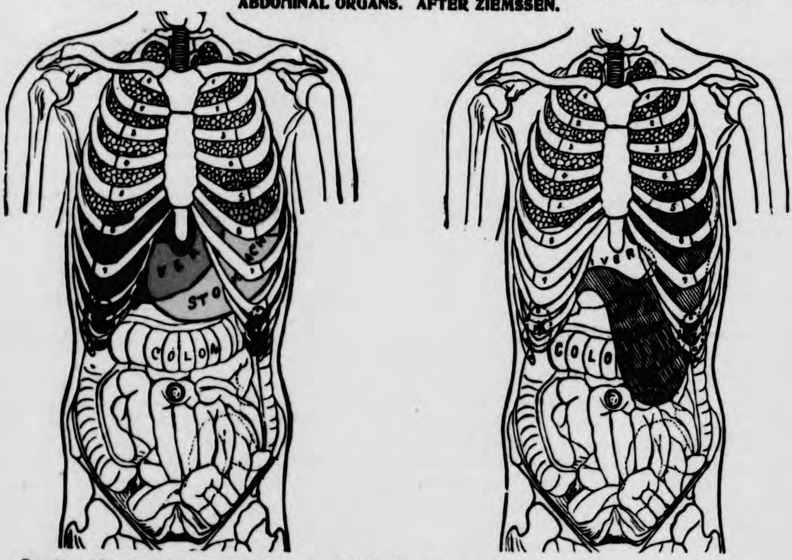
The figures found in columns headed **A'**, **A**, **H**, **C**, and **AC**, relate to the digestion of albuminoid, or proteid substances, and indicate the number of grains of chlorin in different forms found in 100 cubic centimeters of stomach fluid.

The column headed **M** relates to the salivary digestion of starch, the figures having reference to the percentage of sugar (maltose expressed as dextrose) found present in the stomach fluid.

The columns headed ***a***, ***b***, ***c***, ***m***, ***n***, ***x***, ***g***, ***y***, and ***z*** relate to the coefficients of the several kind of work done by the stomach. For explanation of the several coefficients, see preceding page.

The figures given in the several columns of this graphic diagram, represent the highest and lowest figures which have been found in the examination of over 15,000 cases.

DIAGRAMATIC REPRESENTATION OF THE NORMAL POSITIONS OF THE STOMACH AND OTHER ABDOMINAL ORGANS. AFTER ZIEMSSEN.



Results of Physical Examination Respecting the Positions of the Stomach and other Abdominal Organs.

No. 18267

Laboratory of Hygiene of the Battle Creek Sanitarium

BATTLE CREEK, MICH.

J. H. KELLOGG, M. D., Superintendent. F. J. OTIS, M. D., Director.

Report of the Chemical and Bacteriological Examination of the Stomach Fluid Obtained after a Test Meal in the Case of

Mr. B. D. Field ..... State Mich. Date 10-24 1902

Test Meal.— Regular no water 600 potatoe ..... Time of Digestion: ..... h ..... m

Special 30 g pan peptogen " ..... 1 hr ..... m

PHYSICAL EXAMINATION.

Amount ..... 18 c.c. Color ..... N.

Specific Gravity ..... Odor ..... N.

Residue ..... 10 grms. (normal 20 grms.) Blood 0

Estimated stomach contents 18 c.c. (normal 120 c.c.); Mucus { Normal / Catarrhal } 0

MICROSCOPICAL EXAMINATION.

Blood ..... Misc. .....

Pus ....

BACTERIOLOGICAL EXAMINATION.

Bacteria, No. per c.c. (30 c.c. = 1 oz.) { Aerobic 0 ..... / Anaerobic 0 ..... }

Yeast " " 0 .....

Mold " " 0 .....

Acid formation ..... 0 ... Milk coagulation ... 0 .....

Gas production ..... 0 ... Gelatin liquefaction 0 .....

Bread media ..... 0 ... Fruit Media ..... 0 .....

.....

DIGESTION OF PROTEIDS.

	Normal quantities.			
Total acidity	(.180–.200 grms.)	A	.284	grms.
Calculated acidity	(.180–.200 ")	A'	.200	"
Total chlorine	(.300–.330 ")	T	.432	"
Free HCl	(.080–.110 ")	H	.120	"
Acid combined chlorine	(.035–.055 ")	AC	.060	"
Neutral combined chlorine	(.020–.025 ")	N	.024	"
Total combined chlorine	(.090–.120 ")	C	.088	"
Fixed Chlorides	(.100–.110 ")	F	.232	"

Proteids.— Albuminoids — ... Syntonin .. 0 .... Propeptone + ... Peptone ... 0

Ferments ..... Pepsin .14 Rennet .... Rennet Zymogen ..... **Bile** ... 0

DIGESTION OF STARCH.

Saliva, Reaction no spec. { Acid ..... / Alkaline ..... } amount in 5 m ..... grms. 1 c.c. converted 0.1 grms. of starch in ..... m.

Stomach Fluid
- **Maltose (M)** ..... 6.097 ..... grms.
- **Dextrin and Soluble Starch (D)** 2.939 ..... "
- **Starch** Lugol's Sol.,— Blue, Violet, Brown, Yellow, Colorless.
- **Fatty Acids** (from fermentation) (L) ... 1.4 ..... grms.
- **Lactic Acid** ..... **Acetic Acid** ..... **Butyric Acid** .....

COEFFICIENTS.

THE NORMAL COEFFICIENT IS 1.00, EXCEPT IN THE CASE OF FERMENTATION, AND BACTERIAL INFECTION IN WHICH IT IS 0.

Gastric Digestion
- **Proteids (a)** ..... 1.81 ... **Fermentation (x)** 2.08
- **Starch (b)** (1) ..... .84 ... **Bacterial Infection (g)** 0
- (2) ..... 2.43 ... **Solution (y)** ..... .60

Salivary Activity (c) ..... **Motility (z)** 1.01

Relation of Chlorine separated (H + C) to total chlorine (T) (m) .69

Relation of Chlorine separated (H + C) to normal (n) 1.03

Coefficient of Capacity (k) ..... M2 ..... 1.03

Diagnosis.— Classification .....

Remarks: .....

.....

Prescription.— .....

.....

.....

.....

Classification of Functional Disorders of the Stomach

IN RELATION TO PROTEID DIGESTION

Based upon a Quantitative Chemical Examination of the Stomach Fluid Obtained after a Test Meal, in over 15,000 Analyses.

Modified from Hayem and Winter by J. H. KELLOGG, M. D.

HYPERPEPSIA. A′ +.

1. **A′ + H + C + (Typical)**..... (Both HCl and combined chlorin in excess.)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

2. **A′ + H 0, — or = C +**..... (Without excess of free HCl [H].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

3. **A′ + H + C — or =**..... (Without excess of combined chlorin [C].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

HYPOPEPSIA. A′ —.

1. **A′ — H — or 0 (Typical)**..... (All elements deficient.)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

2. **A′ — H = or +**..... (Without deficiency of HCl [H].)
   - 1. $a =$ { 1. Without fermentation (x 0). 2. With " (x +).
   - 2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

APEPSIA. A 0 or — H 0 a 0 or —.

SIMPLE DYSPEPSIA. A′ =.

1. $a =$ { 1. Without fermentation (x 0) (normal). 2. With " (x +).
2. $a -$ { 1. Without fermentation (x 0). 2. With " (x +).

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2. Hyperpepsia without excess of free HCl (**A′ + H — or = C +**).
3. Hyperpepsia without excess of combined chlorin (**A′ + H + C — or =**).

Each of the subdivisions of hyperpepsia presents two types:—

(1.) $a =$, signifying that the proteid digestion is normal in quality.
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METHOD OF INVESTIGATION.

The application of methods of precision in the investigation of disorders of digestion has revolutionized the treatment of this class of maladies. The colorimetric methods of Ewald, Boaz, and others gave only qualitative indications, and proved to be misleading and unreliable. The method of Hayem and Winter, based upon the discovery of Golding Bird, and supplemented by the recent discoveries of Toepfer, give us a complete and exact method whereby a quantitative examination of the stomach fluid may be made, with results as satisfactory as those obtained in the assaying of ores and in similar chemical researches.

Some of the symbols employed (**A, T, H, C,** ***a,*** and ***x***), are borrowed from the excellent work of Hayem and Winter, although their significance is slightly modified by the addition of the method of Toepfer, which strengthens the one weak point in the method of Hayem and Winter, namely, the impossibility of determining the amount of fatty acids present and the amount of neutral chloro-organic compounds included in **C.** Both these points are made clear by the method of Toepfer used in combination with that of Hayem and Winter, the two methods together constituting a perfect system. The determinations pertaining to salivary activity and the gastric digestion of starch, also the method for determining the capacity of the stomach, and the eight new coefficients defined ($b^{(1)}$, $b^{(2)}$, ***c, m, n, y, z, k, g***), have been developed in the Laboratory of Hygiene of the Battle Creek Sanitarium, as the result of the examination and careful study of more than 15,000 stomach fluids, under the direction of the writer.

Explanation of Symbols.—The quantities which are utilized as a basis for the classification of cases in relation to proteid digestion, are **A′H, C, AC, L,** ***a, x,*** and ***g.*** The significance of these several symbols, and of other symbols employed in the computations, is explained below.

A represents the total acidity as determined by acidimetry.

A′ represents the acidity indicated by the amount of free HCl and combined chlorin present (**H + C**), the combined chlorin being taken at its full value. The value of **A′** in a given case is determined by simply adding the quantities represented by **H** and **C.** This value shows the quantity of work done without reference to quality, and is the basis for the division of cases into the four great classes: *Hyperpepsia, hypopepsia, apepsia,* and *simple dyspepsia.*

T represents the total quantity of chlorin found by quantitative estimation, including free HCl (**H**), combined chlorin (**C**), and fixed chlorin or chlorin combined with bases (**F**).

H represents the quantity of free HCl found by quantitative estimation.

C represents the total amount of combined chlorin present in a given case. When the proteid digestion is normal in quality, the combined chlorin represents the same degree of acidity as a like amount of free HCl; there is likely to be present, however, a greater or smaller quantity of neutral chloro-organic compounds, which, possessing no acid value and no nutritive value, give to **C**, as determined by the estimation of chlorin, a value greater than it really possesses.

AC represents the amount of acid or normal combined chlorin, the true measure of useful work done by the stomach in the digestion of proteids. **AC** is found by a combination of the methods of Hayem and Winter and Toepfer, by the following formula: $A - (H + L) = AC$.

L represents the amount of fatty acids found present, expressed in terms of HCl.

Coefficients of Digestive Activity.—The exact mathematical data obtained by this method render possible the determination of a series of highly important coefficients whereby the physician is able to judge at a glance of the percentage degree to which any phase of the digestive process may be in divergence from the normal condition.

a, the coefficient of proteid digestion, represents the real value of the work done in the gastric digestion of proteids. It is determined by the following formula: $\frac{AC}{C \times .40} = a$, the coefficient of proteid digestion. ***a*** is simply a numerical expression of the nutritive value of the combined chlorin represented by **C,** its true acid value and its nutritive value being considered as identical. As the value of the combined chlorin is rarely found at par, the coefficient is considered to be normal when it does not fall more than 10% below par (.90 to 1.00 is considered as $a =$).

b, coefficient (1) and (2), relating to starch digestion, shows (1) the relation of the maltose or perfectly digested starch found in the stomach fluid to the dextrin and soluble carbohydrates which is imperfectly digested or converted; (2) the relation of the amount of maltose or completely digested starch to the amount found in normal digestion.

c, the coefficient of salivary activity, is a numerical expression which represents both the quantity of the saliva formed in a given time and its digestive activity as compared with normal.

x is the coefficient of fermentation. The study of a large number of stomach fluids has established the fact that by the method employed (Toepfer's) .050 grams of fatty acids (expressed as HCl) are found present in normal cases. This amount is accordingly subtracted from the amount of fatty acids (**L**) found present, and the relation to normal is shown by dividing the remainder by 50. For example: If in a given case **L** equals .100, the coefficient of acid fermentation would be as follows: $\frac{100 - 50}{50} = 1$. Each fraction of fifty is counted as one.

g, the coefficient of bacterial infection is obtained by dividing the total number of microbes per cubic centimeter by 20,000, and counting any fraction as one.

m is a coefficient of chlorin separation, showing the relation of the chlorin separated (**H + C**) to the total chlorin (**T**). The normal relation of the chlorin set free to the total chlorin (**T**) is .66.

The coefficient ***m*** is obtained by the formula $\frac{T - F}{T \times .66} = m$ or $\frac{T - F}{T} \times 1.5 = m$.

n is a coefficient of chlorin separation, showing the relation of chlorin set free (**H + C**) to the normal amount. The average amount of chlorin separated in normal digestion is .190 grams per 100 c.c. of stomach fluid. The coefficient ***n*** is determined by the following formula: $\frac{H + C}{190} = n$.

y, the coefficient of solution obtained by comparison of the undissolved residue of the fluid with the total amount of stomach fluid obtained, is a rough means of determining the degree of digestive activity.

z is a coefficient of motility obtained by a comparison of the amount of residual fluid found in the stomach at the end of the first hour of digestion after a test meal, with the normal amount.

k is a coefficient of capacity determined by the exact measurement of the capacity of the stomach in cubic centimeters, the amount thus obtained being divided by the height of the individual in millimeters. The writer's observations have shown that there is normally one cubic centimeter of stomach capacity for each millimeter of height.

Battle Creek, Mich., Sept. 1, 1900. J. H. KELLOGG, M. D.

GRAPHIC REPRESENTATION

Of the Results of the Chemical Examination of Salivary and Gastric Digestion, Based upon the Study of over 15,000 Cases in the Physiological Laboratory of the Battle Creek (Mich.) Sanitarium.

Case of *B. D. Field*

ARRANGED BY
J. H. KELLOGG, M. D.

	A'	A Total Acidity.	H Free HCl.	C Combined Chlorin.	AC Acid Combined Chlorin.	M Starch Digestion.	COEFFICIENTS OF DIGESTIVE WORK. Chlorin Liberation. m	n	a	Fermentation. x	Starch Digestion. b(1)	b(2)	c Salivary Activity.	y Solution.	z Motility.
HYPERPEPSIA.	.480	.480	.320	.350	.225	8.00	2.00	2.00	2.50	100	2.00	6.00	10.00	2.00	6.00
	.410	.440	.305	.320	.200	7.00	1.90	1.90	2.35	75	1.90	5.00	9.00	1.90	5.00
	.390	.410	.290	.300	.180	6.50	1.80	1.80	2.20	50	1.80	4.00	8.00	1.80	4.00
	.370	.385	.275	.285	.165	6.00	1.70	1.70	2.10	40	1.70	3.00	7.00	1.70	3.00
	.350	.360	.260	.270	.150	5.75	1.65	1.65	2.00	30	1.65	2.50	6.00	1.65	2.50
	.335	.340	.245	.255	.140	5.50	1.60	1.60	1.90	20	1.60	2.25	5.50	1.60	2.25
	.320	.320	.230	.240	.130	5.25	1.55	1.55	1.80	15	1.55	2.00	5.00	1.55	2.00
	.305	.305	.215	.225	.120	5.00	1.50	1.50	1.70	10	1.50	1.75	4.50	1.50	1.75
	.290	.290	.200	.210	.110	4.75	1.45	1.45	1.60	9	1.45	1.50	4.00	1.45	1.50
	.275	.275	.185	.195	.100	4.50	1.40	1.40	1.50	8	1.40	1.45	3.50	1.40	1.40
	.260	.260	.170	.180	.090	4.25	1.35	1.35	1.40	7	1.35	1.35	3.00	1.35	1.35
	.245	.245	.155	.165	.080	4.00	1.30	1.30	1.30	6	1.30	1.30	2.50	1.30	1.30
	.230	.230	.140	.150	.070	3.75	1.25	1.25	1.25	5	1.25	1.25	2.00	1.25	1.25
	.220	.220	.130	.140	.065	3.50	1.20	1.20	1.20	4	1.20	1.20	1.75	1.20	1.20
	.210	.210	.120	.130	.060	3.25	1.15	1.15	1.15	3	1.15	1.15	1.50	1.15	1.15
NORMAL.	.200	.200	.110	.120	.055	3.00	1.10	1.10	1.10	2	1.10	1.10	1.25	1.10	1.10
	.195	.195	.102	.112	.050	2.75	1.05	1.05	1.05	1	1.05	1.05	1.10	1.05	1.05
	.190	.190	.095	.105	.045	2.50	1.00	1.00	1.00	0	1.00	1.00	1.00	1.00	1.00
	.185	.185	.087	.098	.040	2.25	.95	.95	.95	1	.95	.95	.90	.95	.95
	.180	.180	.080	.090	.035	2.00	.90	.90	.90	2	.90	.90	.80	.90	.90
HYPOPEPSIA.	.170	.170	.075	.085	.032	1.80	.85	.85	.85	3	.85	.85	.70	.85	.85
	.160	.160	.070	.080	.030	1.60	.80	.80	.80	4	.80	.80	.60	.80	.80
	.150	.150	.065	.075	.028	1.45	.75	.75	.75	5	.75	.75	.50	.75	.75
	.140	.140	.060	.070	.026	1.30	.70	.70	.70	6	.70	.70	.40	.70	.70
	.130	.130	.055	.065	.024	1.15	.65	.65	.65	7	.65	.65	.30	.65	.65
	.120	.120	.050	.060	.022	1.00	.60	.60	.60	8	.60	.60	.25	.60	.60
	.110	.110	.045	.055	.020	.85	.55	.55	.55	9	.55	.55	.20	.55	.55
	.100	.100	.040	.050	.018	.70	.50	.50	.50	10	.50	.50	.15	.50	.50
	.085	.085	.035	.045	.016	.60	.45	.45	.45	15	.45	.45	.12	.45	.45
	.070	.070	.030	.040	.014	.50	.40	.40	.40	20	.40	.40	.10	.40	.40
	.055	.055	.025	.035	.012	.40	.35	.35	.35	30	.35	.35	.08	.35	.35
	.040	.040	.020	.030	.010	.30	.30	.30	.30	40	.30	.30	.06	.30	.30
	.025	.025	.013	.020	.007	.20	.20	.20	.20	50	.20	.20	.04	.20	.20
	.010	.010	.007	.010	.004	.10	.10	.10	.10	75	.10	.10	.02	.10	.10
ANACHLORHYDRIA.	.000	.000	.000	.000	.000	.00	.00	.00	.00	100	.00	.00	.00	.00	.00
							m	n	a	g	b(1)	b(2)	c	y	z

WELL DISINTEGRATED.

IMPERFECTLY DISINTEGRATED.

The figures in each of the columns of the above diagram relate to a particular quantity or quality of stomach work. The point at which the line starts indicates the class to which the case belongs, and the degree of hyperpepsia or hypopepsia, as the case may be, if the figures fall outside the normal limits.

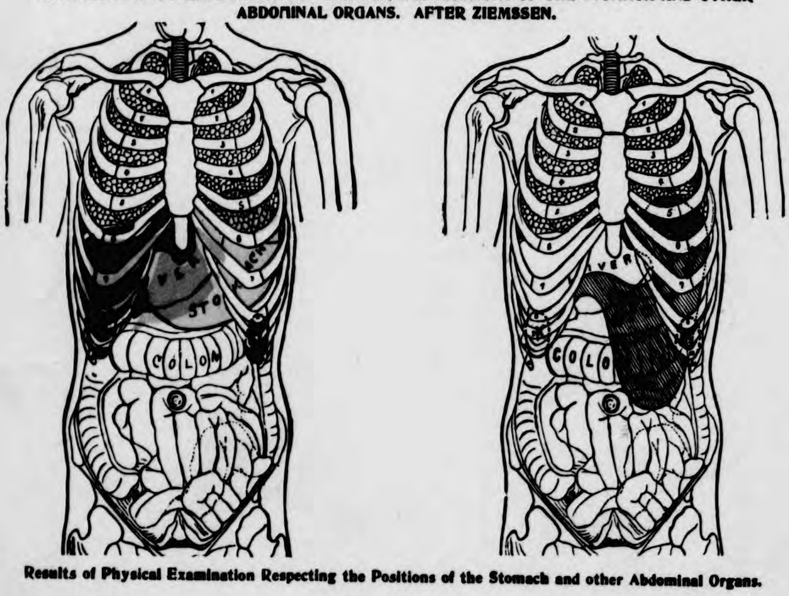
The figures found in columns headed **A'**, **A**, **H**, **C**, and **AC**, relate to the digestion of albuminoid, or proteid substances, and indicate the number of grains of chlorin in different forms found in 100 cubic centimeters of stomach fluid.

The column headed **M** relates to the salivary digestion of starch, the figures having reference to the percentage of sugar (maltose expressed as dextrose) found present in the stomach fluid.

The columns headed ***a***, ***b***, ***c***, ***m***, ***n***, ***x***, ***g***, ***y***, and ***z*** relate to the coefficients of the several kind of work done by the stomach. For explanation of the several coefficients, see preceding page.

The figures given in the several columns of this graphic diagram, represent the highest and lowest figures which have been found in the examination of over 15,000 cases.

DIAGRAMATIC REPRESENTATION OF THE NORMAL POSITIONS OF THE STOMACH AND OTHER ABDOMINAL ORGANS. AFTER ZIEMSSEN.



Results of Physical Examination Respecting the Positions of the Stomach and other Abdominal Organs.

Lesson 8

Quiz.

CARE OF THE FOOD SUPPLY.

1.- What germs are likely to be propogated in moist foods? Why? With what rapidity do they grow?

2.- Does cold destroy germs? Of what value is an ice box or refrigerator?

3.- Are germs likely to gain access to foods stored therein? How? Describe the construction of a refrigerator.

4.- At what temperature ought it to be kept?

5.- How can this best be accomplished?

6.- What is the need for care in regard to cleanliness? How may this be maintained.

7.- Write a program of details for thorough cleansing of a refrigerator. In what especial points should care be taken.

8.- What is likely to be the result if the linings are cracked or toen?

9.-- What is the sanitary value of the swing shelf and wire safe in cellars for food storage?

10.- What harm is likely to result from the use of moldy foods.

11.- What conditions are most conducive to propogature of molds?

12.- How should such foods as Zwieback, etc., stored in damp places be treated?

13.- What should be done with left over moist foods?

14.- How would you keep food cold without ice or a cellar?

15.- How may germs be destroyed? How are foods rendered sterile?

16.- How are perishable foods to be treated?

17.- What should fruits be washed with? Why?

18.- What measures are desirable for the storage of left over foods?

THE CARE OF THE FAMILY FOOD SUPPLY.

Prelude. That "eternal vigilance is the price of safety" is a truism in all departments of housekeeping, but particularly so in that which pertains to the care and keeping of the family food supply.

1.- Those micro-organism, mold and bacteris, find in moist food substances just the soil they require for rapid propagation, and under the right conditions multiply so rapidly it has been estimated that a single germ would in twenty-four hours increase to 16,500,000. It is evident, then, that since these organism are so prolific, and so often an insidious danger to health, the food supply of the household should be guarded in the most zealous manner against their encroachments.

2.- The Refrigerator.--A low temperature retards the vigor and growth of micro-organisms, so as ice box, refrigerator, or some other sort of cold storage is considered an indispensable requisite in most homes. Cold does not destroy germs. On the contrary, while it lessens their activity, most varieties withstand a freezing temperature, and even when inbedded in ice for a season, resume active operations when thawed out. This latter fact should serve as a caution to housekeepers not to cool drinking water and other beverages by the addition of ice, unless it is known to be from a source above suspicion.

3.- There are those who fancy that the utility of a refrigerator is largely due to its exclusion of air with its accompanying macro-organisms. Such overlook the fact that germs and spores enter the refrigerator along with its varied

contents, that they are already in possession, and will increase in proportion as the conditions they find are favorable. Perfect cleanliness and uniform cold are the least favorable to their development.

4.- Temperature.--A temperature as low as 40 degrees is desirable. A refrigerator from which the ice has mostly melted because of its humidity and warmth, furnishes conditions under which food substances will spoil more quickly than when left in the same temperature on the pentry shelves.

5.- To keep the refrigerator in good working order the ice should be replenished sufficiently often so that there will be no great variation of temperature. This is also the most economical plan, as it requires double the quantity of ice to cool the compartments that would be necessary if added before the previous supply was greatly diminished. A thermometer hung inside is useful.

6.- Cleanliness.--Absolute cleanliness of the whole interior, even of the waste pipe, must be maintained, and on no account should the refrigerator waste pipe be connected with the kitchen drain or the sewer pipe. A tray to receive the drippings, sunk in the floor under the refrigerator, with a waste pipe attached, thus avoiding a direct connection with any drain pipe, is an excellent arrangement. The refrigerator, if mounted on caters, can be easily dolled one side to permit of a thorough cleaning of the tray as frequently as required.

That the interior of the refrigerator appears clean should not be considered sufficient. The little micro-organisms that spoil the food are invisible to the eye. To

make sure that all the compartments are sweet and free from spores of mold or bacteria, the refrigerator should receive a thorough cleaning at least once a week, and oftener if needed. It shouldbe inspected daily, and any portion of its contents likely to breed germs removed at once, and such cleansing done as is needed.

7.- For a thorough cleansing, everything removable should be taken out and the whole interior carefully washed, first with soap and water, then with borax or salsoda water, afterward rinsed in clean water, then dried and aired well. The ice box should receive special attention. Most ice, even when well rinsed off on the outside, as it should always be before being put into the ice box, contains bits and fragments of vegetable matter that were floating about in the water when it was frozen, which, as the ice melts, are likely to lodge in the ice box or waste-pipe and if not removed, soon decay, and become a prolific source of germ growth. It is a good plan to flush the ice box and waste pipe with a stream from the spout of a teakettle in which the water was actively boiling. If this does not sufficiently clean out the pipe, a flexible wire with a wet cloth around it may be run through, after which it should be subjected to the same cleaning as other portions of the refrigerator. The shelves and racks may be washed at the sink. Care must be taken that all the grooves, corners, and projections are reached in the cleansing. An atom of any fermenting or decomposing food material left undisturbed in a crack or corner is sufficient to start a whole new culture of germs.

8.- In the purchase of a refrigerator, an unlines wooden

interior should be considered out of the question, as water-soaked wood soon becomes decaying wood, flavoring the foods, and harboring and perpetuating germs. Even shelves of wood are objectionable for the same reason. The whole compartment should be so constructed that moisture cannot come in contant with wood at any point. An interior lined with metal or glass is easily kept in good condition with proper care. The lining must, however, be kept intact, and if torn or broken, should be repaired at once, as such a breach, even though small, forms the very best hiding-place for microbes. A hairlike crack in the neck of one of several flasks in which had been selaed some sterilized food material was sufficient to allow the ingress of bacteria, which quickly spoiled the whole, although the contents of all the other flasks remained in perfect condition until unsealed, a whole year later.

9.- If, as in many country homes, the only cold storage is a wire safe in the basement or swing shelf in the cellar, the need of intelligent care is no less important. Wire screening may protect food from the ravage of rats and mice and from flies, but it is no safeguard against the depredation of germs. The spores of mold which are constantly flying about in the atmosphere are apt to be especially abundant in apartments wholly or partially underground.

10.- The use of moldy foods is often productive of serious digestive disturbances.

11.- There are many varieties of molds. Some are sufficiently large to be readily observed, while others are difficult of detection. Breads, cakes, pudding, and other moist foods, kppt for a time in a warm, damp atmosphere are liable to be

attacked with mold in the interior before there is any appearance of it on the outside.

12.- Dry foods, such as zwieback, granose biscuit , and wafers, gather moisture in the damp air of a basement, and such articles when thus stored ought to be thoroughly heated through in the oven or rebaked before using.

13.- Moist foods left over from one day to another should be recooked at boiling temperature. There is danger of mold when the food is stored in a basement or cellar unless the apartment is more than ordinarily dry, light, and well-ventilated.

14.- Emergency Methods.--If neither ice nor a cool room is available, perishable foods may be suspended near the water in a deep well, or put where a constant stream of cold water will surround the dish containing the food, as in a spring house. A pail placed inside a larger one containing cold water which is changed as often as it becomes warm, or a tightly covered dish sunk in moist sand at sufficient depth to keep it cool are other devices for the same purpose. Any measures to prevent germs getting into the food, to lessen greatly their activity, or totally to destroy them are the measures to be sought in the keeping of the foods.

15.- Heat equal to the temperature of boiling water will destroy most germs, although there are a few which withstand a temperature upward of 240 degrees. Many foods are thus rendered sterile by boiling and sealing when in this condition in airtight receptables, whereby they are preserved indefinitely. Milk and cream remain sweet for several daysm even weeks, if well sterilized.

Lemons, which are often preserved for quite a length of

time by being kept immersed in a tub of water, will remain fresh nearly twice as long if the water used is first sterilized by boiling. The water should be changed once a week, only that which has been boiled being used each time.

16.- Perishable food stuffs, like asparagus, parsley, etc., are kept fresh much more satisfactorily by being placed in some cool place with their stems in sterilized water.

17.- For all such culinary operations as the washing of grapes, berries, and other small fruits, celery, lettuce, cabbage, or other food stuffs, to be served without cooking, sterilized water or that known to be perfectly pure should be used.

18.- For the keeping of left over-foods, as grains, vegetables, or others of a moist nature, care needs to be taken that they be removed to clean dishes before putting away. Unless this precaution is observed, the thin smears and tiny bits upon the edge of the dishes will become sour or moldy much sooner than the larger mass, and thus become a source of contamination to the whole.

In dealing with the question of the wholesome preservation of food, it must not be overlooked that the dishes in which foods are stored must themselves be clean and free from germs. Not a few spoiled foods could be traced to a careless washing that left drops of dirty dish water or atoms of food in seams and grooves to decompose, and breed bacteria, or to the sour, wet dish towel which left a smear of germ food over its entire surface. Verily, "eternal vigilance <u>is</u> the price of safety."

you ever tasted had more sugar in it than acid, but the acid overbalances the sugar.

In the muskmelon we have very little protein and a large amount of water, and the sugar is present in considerable quantity. The nectarine has about 16% of sugar, and the orange is rich in sugar, having 12%; so orange juice is very nourishing.

3. Sea Algae. In Japan various sea algae are in use; for instance Porphyra vulgaris, Enteromorpha compressa, Cystoreira species, Capea elongata, Laminaria japonica etc. The well known agar-agar(Ceylon moss, Jaffa-orTaffeamoss) is produced from Gelidium cornuum, Euchema spinosum Ag. and Gracilaria lichenoides, a mass which, similar to bone gelatine, dissolves in water to a jelly, and may therefore be designated as vegetable isinglass.

Agar-agar may be used when it is not desired to give the body bone lime (as in nutrition of the sick), as a substitute for the lime-giving tissues (calves' feet, islnglass, etc.) and as a substitute for bone gelatine; it serves especially in the preparation of puddings.

--König, vol.2, page 669.

FRESH VEGETABLES AND FRUITS, salad greens and fresh fruits of all sorts are of special dietetic value. These uncooked substances contain distase and enzymes which aid various bodily functions, especially by rendering active the digestive juices. Cooking destroys many of these subtle and useful foodstuffs, which can be easily digested without cooking. Cookery is best confined to such foodstuffs as cannot be well digested and assimilated without the aid of the physical and chemical changes produced by heat. Recent experiments show that young cellulose, such as is found in fresh vegetables, is quite easily digestible and that it does not as was formerly supposed pass through the alimentary canal without undergoing change.

~~THE CHIEF VALUE OF FRESH VEGETABLES~~ The chief value of these articles, however, consists in the large amount of alkaline salts which they contain and by means of which they are able to make an important contribution to the dietary. The investigations of Bunge show that the cereals, especially the whole grain cereals, ~~the~~ whole wheat flour, oatmeal, cracked wheat, etc., contain an excess of the acid substances and when used too exclusively give rise to a state of the blood which is incapable of high resistance. Vegetables and fruits of all sorts contain considerable of the alkaline salts and hence are valuable for supplementing the cereals. These salts are useful also in neutralizing the acid wastes of the body.

All kinds of bodily activities result in the production of acid. All fruits and vegetables contain considerable quantities of potash and soda in combination with organic acids--citric and malic acids. These acids are burned in the body, being neutralized the same way as starch and carbohydrates in producing heat and other forms of energy. This leaves the soda and potash free to combine with the excrementitious acids of the body, thereby to a large degree destroying their noxious properties and facilitating their removal through the kidneys.

Another service of great value which is rendered by fruits and vegetables

because of their richness in alkaline substances is the increasing of vital resistance. The blood is naturally alkaline. The more active the white blood-cells or body defenders, the higher the bodily resistance. When the alkalinity of the blood is reduced by an excess of acids produced in the tissues by work or derived from the flesh of other animals through meat-eating the resistance of the body is diminished.

- J. H. Kellogg. M. D.

Mr. Killoran: Dr. Kellogg asked me to give this to you.
S. B.

A FLESH ABSTAINER'S VICTORY.

A note just received from Mr. Karl Mann announces another vindication of the low protein theory of diet, in the victory of Mr. Emerich Rath who has been for ten years a flesh abstainer, as well as an abstainer from alcohol. The test consisted of a forced march of thirty miles in which each pedestrian was required to carry 60 pounds of baggage. The German Department of War offered a prize. One hundred sixty persons entered the contest among many of whom were soldiers who had had much training in forced marching. Mr. Rath, who was by occupation a merchant, was a victor in this severe test of endurance as well as in seven previous international tests of the same sort.

Such a succession of victories in which a merchant not a trained athlete nor a pedestrian by profession always comes out ahead of flesh eaters, cannot be looked upon as accidental or as the result of enthusiasm in defense of a theory.

There is a good physiologic reason why a flesh abstainer should win in tests of endurance. Dr. Frederick S. Lee, Professor of physiology in Columbia University, New York, has shown by experiments upon animals that skatol, indol, and other of the products of putrefaction which are produced in great quantities in the intestines of flesh eating animals and flesh eating men, produce fatigue when introduced into the body of a healthy and vigorous animal. It is evident then that the man or the animal whose blood tissues contain the least of these poisons is likely, other things being equal, to possess greater endurance than one whose blood and tissues are flooded with these poisons absorbed from an intestine filled with putrefying remnants of undigested flesh.

EXTRACT FROM "FOOD NUTRITION AND HEALTH" by McCollum and Becker, pp.98-100

Isotonic Salt Solution. — A practice which is much more effective, and which has been known and followed for many years is that of drinking, on first rising, in the morning, a liberal amount of water containing the proper amount of common salt. This is not quickly absorbed and excreted by the kidneys since it contains the same amount of salt as does the blood. Under these conditions the salt water merely runs through the stomach and intestines and washes them out. In the morning the stomach and upper intestine are empty except for saliva and small residues of secretions. One is at this time about twelve hours away from the last meal of the preceding day. Everything which is of value has been secured from the food taken during the previous day. Anything further which is absorbed does more harm than good. If one takes upon rising the following solution it will pass through the stomach and intestine and wash them out. The solution to which we refer is a quart of water at about body temperature containing two teaspoonsful of common table salt. This solution has about the same concentration of salt in it as is contained in the blood, viz., 0.8 of one per cent. The water containing this amount of salt will taste slightly salty but not bitter. One should take this salt water an hour or more before breakfast. It has been found by several years of experience that if one drinks as much of this as possible with comfort (some individuals take only two cups, others three cups, and others the entire quart) and then lies down for about half an hour, the solution passes through the stomach and intestine more quickly than if one stays on his feet after taking it. This differs, however, with individuals. One can soon tell after two or three mornings which way it works most effectively. One should not eat breakfast until the salt water has passed out of the stomach. If it is taken at the proper temperature it will pass out of the stomach in from half to three-quarters of an hour, although it may pass out sooner. In a healthy subject there is practically no absorption of the salt water by the system. By following this

	Yeast	Bacteria	Soluble Sugar expressed in terms of maltose	Acidity in terms of hydrochloric acid	Sulphates
Grammuts	0	Few none produce acid	26.64%	0.36%	0
Grape-nuts	0	Very few slight acid production	20.70%	0.46%	0
Malt Ose	0	Few Produce slight acid	8.36%	0.20%	0

Grains	Pro.	Car.	Fats.	Total.
Barley	14,883	75,637	6,123	96,643
Bean (So. Russian	18,402	80,400		98,402
Buckwheat	14,175	81,421	4,847	100,433
Corn, Flint	14458	77,679	12,247	104,384
" , Dent	13,324	77,679	12,757	103,760
" , Sweet	16,159	71,101	19,901	107,161
Irish Moss	31,185	63,744	3,572	98,501
Millet	14,883	77,338	10,716	102,937
Oats	15,167	66,112	19,901	101,181
Rice	9,498	89,019	2296	100,812
Rye, Winter	15,592	84,596	4,847	105,037
Rye, German	19,845	88,452		108,297
Wheat, Poland	30,476	70,194	3,827	104,497
" White	16,443	80,514	3,316	100,273
" Durhe	19,561	81,874		101,436
" Japanese	23,388	73,710	4,082	101,181
Flour				
Arrowroot		92,988		92,988
Banana	4,110	88,338	127	92,576
Barley	16,159	80,740	3,827	100,627
Bean	32,886	67,359	5,358	105,603
Buckwheat	12,615	84,256	4,082	100,954
Cornmeal	13,749	78,813	9,695	102,258
Graham	16,584	79,266	4,337	99,188
Oatmeal	21,404	76,254	18,115	115,775

Nuts	P.	Ta	F.	Total
Almonds	29,767	19,618	140,077	189,462
Beechnuts	31,043	14,968	146,456	192467
Brazil Nut	24,097	7,938	167,100	199135
Butternuts	39,548	3,969	156,153	199670
Chestnuts (fresh)	8,788	47,741	13,778	70307
Chestnuts (dried)	15167	84,142	17,860	117169
Cocoanuts	8079	31,638	126575	166292
Filberts	22,113	14,742	166,612	203467
Hazelnuts	24,664	8164	156593	189421
Hickorynuts	21,829	12927	171971	206727
Peanut	36,571	27669	96,557	160797
Pecans	15,592	15082	181666	212340
Pinenuts	9,213	29710	151841	190764
Pistachios	31,830	18,484	137781	188095
Walnuts (black)	39123	13,267	143649	196039
Walnuts (eng. sh'l'd)	28530	18,257	161765	203552

Samilas Nut Products	P.	C.	Fat	Total
Almond Butter	29,767	19,618	140,077	189,462
Bromose	27,783	44,679	61,236	133,698
Malted Nuts	33,594	49,782	70,421	153,797
Malt-Honey	54,857	73,165		128,022
Maltose		51,030	85,050	136,080
Nut Meal	40,115	2,041	118,879	161,035
Nuttolene	17,180	1,099	49,652	67931
Protose	30,192	3,231	26,101	59524
Peanut Butter.	23247	10,773	67359	101379
Fruits				
Apple	567	13608		14175
Apple, dried.	1842	123492		125334
Apricot	708	12474		13,182
Blackberry	708	6237		6945
Banana	2693	32,659	1530	36882
Cherry	992	13,608		14600
Cherry, dried	2835	51,483	765	55083
Cranberry	141	1701		1842
Currant	708	8278		8986
Dates, dried	12757	65772		78529
Figs, dried	5670	56473		62143
Gooseberry	708	9639		10347
Grapes	850	18484		19234
Lemon	1417	9639	1786	12842
Muskemelon				

Honey		82895		82895
Syrup	1134	88905		90039
Vegetables				
Asparagus	2651	3061	765	6477
Beans, field	35437	54772	4337	94546
Beans, French Kidney	33594	63050	5613	102257
Beans, White	38130	55339	7654	101123
Beans, Lima	3043	68720	4082	103845
Beans, String	3827	7597	255	11679
Beet	1842	10206	256	12303
Beet, Sugar	2835	10206	1275	19192
Carrot	1701	10432	765	12898
Cauliflower	3543	5216	765	9524
Celery	2126	13381	1020	16527
Cucumber	1701	2821		4522
Cabbage, red	2551	6690	510	9751
Cabbage, winter	5670	13154	2296	21120
Cabbage white	2693	5556	5103	13352
Lentils	36713	60102	4847	101662
Lentils German	46777	11680	20198	78655
Lettuce head	1984	340	5613	72291
Melon	1417	7030	765	9212
Onion	2409	12247	255	14911
Peas African	33170	65545	1530	100245
Peas green shelled	30759	65431	4847	101037
Peas green garden	9070	13608	12757	35437

Fruits	P.	C.	F.	Total
Nectarines	850	18030		18880
Orange	1134	13154	510	14798
Peach	992	5103	2296	8391
Pear	567	13041		13608
Pear, dried	2835	55452		58287
Persimmons	1134	35721	1786	38641
Pineapple	567	10999	765	12331
Plum	567	20979		21546
Pomegranate	2126	22113	4080	28321
Prune, fresh.	1134	12587		13721
Prune, dried	3260	55792		59052
Raisin	3402	70421	1530	75353
Raspberry	567	13721		14288
Strawberry	1559	7938	1275	10772
Whortleberry.	1134	6690		7824

15 Foods						
Cherry canned	9.2	.5 pt	1.1	.1	31.1	25700
Peach "	9.2	.5 "	.3	.3	18.	21600
Strawberry "	9.2	.5 "	.7		24.	28200
Huckleberry fresh	9.2	.5 "	.7	3.	13.5	23900
Melon			.6		9.3	11436
Plum canned fresh			1.		20.1	24200
Fig steamed ~~boiled~~	7.1	.5 pt	4.		49.8	62100
Apple Baked	5.5	1 large	2.	.8	37.2	47000
Rice boiled	5.7	.5 pt.	2.8	.1	24.4	31800
Cornmeal mush by value	8.6	.5 pt	2.1	1.2	18.5	27000
Crystal Wheat	7	.5 pt	5.7	3.	29.5	49100
Gluten mush	8.25	.5 pt	12.	.6	22.	43400
Graham mush	7.	.5 pt.	5.8	.9	35.8	51100
Wheatlet	7.	.5 pt	5.7	.8	29.5	43500
Macaroni	6.5	.5 pt	10.	2.	75.	91570
Apple sauce	8.1	.5 pt.	2.	.8	37.2	40000
Butter			1.	83.		28000

			P	F.	C.	
Sugar	7	.5 pt.				
Cream	8.5	.5 pt.	2.7	26.7	97.8	
Milk	8.5	.5 pt.	7.1	3.9	5.2	75 000
Butter	7.4	.5 pt	.6	84.4	.6	21 000
Eggs	1.5	1	14.	10.5		217 000
Oranges	8.5	.5 pt	3.7	3.6	4.7	47 000
Cottage Cheese	7.7	.5 pt	20.9	1.	4.3	37 000
Malted Milk	3.8	.5 pt.	23.7	27.6	49.9	15-3 000
Almond cream (3/4 water)	7.8	.5 pt	5.2	13.7	4.3	48 000
Brownie	1	2 cakes	19.6	24.	39.4	187 000
Malt Honey	10.6	.5 pt.	3.87		49.61	77 000
Nutrolene	6.4	.5 pt	12.12	19.46	9.7	68 000
Protose	4.2	.5 pt	21.3	10.23	2.85	60 000
Stewed Nutlets (Sanit.)	9	.5 pt	6.	9.7	4.8	34 000
Pecans		.5 pt.	11.	71.2	13.3	272 000
Cocoanut		.5 pt	5.7	50.6	27.9	168 000
Almonds shelled	5.0	.5 pt	21.	54.9	17.3	189 000
Peanuts		.5 pt	25.8	38.6	24.4	162 000
Chestnuts dried		.5 pt	10.7	.7	74.2	116 000
Apples fresh	6	medium	4.		7.2	14 000
Bananas	2	1 peeled	1.9	.6	28.5	36 000
Oranges	2	1 peeled	.8	.2	11.6	15 000
Lemons	2.	1 peeled	1.	.7	8.5	12 000
Berries canned	9.8	.5 pt.	1.1	1.4	13.	26 000
Dates	2	7	9.		58.	78 000
Prunes stewed (1/2 water)	9.2	.5	1.2		22.5	27200
Raisins stewed (1/2 water)	9.2	.5	1.2	.3	27.3	32400
Peach pie	3	1 piece 1/8 pie	.7		7.5	6000
Fruit punch	8.8	.5				
Grapes fresh	5	1 av. bunch	.6		14.3	17000
Apricot sauce	9.5	.5	1.9	1.3	48.8	61300
Berries fresh	3.7	.5 pt	1.1	1.4	15	22100

Foods	Weight gr.	Measure	Protein	Fats	Carbs	Calories in gr.
Granola	4.2	.5 pt	15	3	75	114000
Granose	2.7	4 biscuits	15.4	2.8	77.1	117000
Zwieback	1.1	1 piece	13.6	2.0	70	104000
Graham Crac.	1	2	9.8	13.6	70	128000
W. W. Wafers	2.5	6	9.8	13.6	70	128000
Rolls	2	3	11.7	1.2	80	110000
Graham Bread	1	1	9.5	1.4	53.8	77000
Whole W. Bread	1	1	8.7	6.0	64.	100000
White Bread	1	1	5.3	.8	48.3	64000
Nut Gravy Toast	6	1 piece	4.5	4.	13.	31000
Prune Toast	6	1 piece	3.3	.3	42.1	53000
Berry Toast	6	1 piece	3.2	1.5	24.1	36000
Cream Toast	6	1 piece	5.4	7.4	15.4	44000
Potato boiled	7	.5 pt	2.5	.1	20.9	17000
~~Sweet Potato~~ Ca		.5 pt	3.	2.1	42.1	57000
Tomato fresh	8	1 average	.9	.4	3.9	6000
Nut Gravy (5 brazil)	9	.5 pt	2.7	4.4	1.6	16000
String Beans (canned)	7.7	.5 pt	1.1	.1	3.8	6100
Baked Beans	7.3	.5 pt	6.9	2.5	19.6	38300
Spinach cooked	6.	.5 pt	2.4	4.1	2.6	16700
Asparagus canned	7.4	.5 pt	2.1	3.3	2.2	13800
Corn (green)	8.	.5 pt	2.8	1.2	19.	28500
Green Peas	8.2	.5 pt	3.6	.2	9.8	16700
Squash (cooked)		.5 pt	.9	.5	10.5	14400
Lettuce	2.6		1.2	.3	2.9	5700
Beets cooked		.5 pt	2.3	.1	7.4	11900
Soup cream pea	8.5	.5 pt	2.6	2.7	5.7	17000
Soup tomato	8.5	.5 pt	1.8	1.1	5.6	11700
Vegetable soup	8.5	.5 pt	2.9		.5	4800

Fill out wt & send to Dr Ishlman
Residence

	measure	weight
Potatoes (boiled)	.5 pt	210 gms
Sweet Potatoes canned	.5 pt.	could not get it
String Beans canned	.5 pt	223½ "
Baked Beans	.5 pt	220 "
Spinach cooked	.5 pt	181.2 "
Asparagus cooked	.5 pt	224 "
Corn canned	.5 pt	240 "
Peas canned	.5 pt	248 "
Squash canned cooked	.5 pt.	could not get it
Lettuce	.5 pt	80 gms
Beets cooked	.5 pt	could not get it
Butter	.5 pt.	222½ gms
Cottage Cheese	.5 pt.	233.2 "
Walled nuts	.5 pt.	114 "
Almond Cream	.5 pt.	234.7 "
Malt Honey	.5 pt.	317.3 "
Mutton	.5 pt	194 "
Prunes	.5 pt	125 "
Pecans or Almonds	.5 pt	151.4 shelled "
Berries fresh	.5 pt	119 "
Plum canned	.5 pt	242 "
Fig dried stewed	.5 pt	218.3 " stewed 197.5 " dried
Cornmeal muffin	.5 pt	260.3 "
Apple sauce	.5 pt	248 "

Supplies of Law.
Furnish to
student any
articles needed
on this list —
at most half retail
when through
May 8, 1902 L. B. E

	P.	C.	T	Total
Peas small	34870	59648	8930	103448
Parsnip	1701	8164	1530	11395
Potato	3118	23814	510	27442
Potato sweet	1417	28690	510	30617
Pumpkin	1559	7484	255	9398
Spinach	4961	4989	1530	11480
Squash		8845	255	9100
White Turnip	2126	3402	510	6038
Tomato	2268	2835	765	5868
Meats				
Beef Lean	13182		9185	22367
Beefsteak	26790		31128	57918
Egg Entire	19845		26790	46635
Egg White of	28917			
Egg Yolk of	22680		78331	101011
Fish White	25656		7399	33055
Fish Brook Trout	27216		5358	32574
Fowl	27357		41589	68946
Mutton Lean	25940		12502	38442
Oysters	8505	3742	3316	15563
Pork (Ham)	13891		123978	
Poultry	29767		9695	39462
Salmon	22821		1275	24096
Veal	23388		40313	63701

Milk & Butter	A.	C	F	Total
Milk Cows.	5811	5896	9950	21657
Buttermilk	5811	4082	1786	11679
Mothers Milk	4252	6123	8164	18639
Skimmed Milk	5670	4309	4592	14571
Cream	3827	3175	68125	75127
Chese cottage	29625	4876	2551	36052
Chese Stilton	37138	40143	8419	85690
French Butter	226		220449	220675
Swedish Butter	850	680	215346	216876
Milk & Cow Inc.	1409	3175	99722	104306

	P.	C.	F.	Total
Cornmeal	21744	75264	18105	115113
Pea	31288	64064	5100	105452
Rye	16704	78144	5100	99800
Wheat	15984	84448	2805	103237
Breads				
Barley Bread	13536	77392	2550	93478
Beaten Biscuit	16848	89600	3060	109500
Graham Bread	13680	59696	3570	76946
Graham Cracker	14112	78400	34680	127192
Granola	21600	84000	7650	113250
Grainut	16632	86307	3595	106534
Granose	22176	88592	5865	116633
Macaroni	12960	86016	765	99741
Manna	2679	81424		84100
Passover Bread	16848	89600	3060	109500
Rye Bread	8784	55104	1020	64908
Rye Bread	13392	79856	2550	95798
Rolls	16848	89600	3060	109508
Sticks	16848	89600	3060	109508
Swedish Spice Bread	14400	84448	2550	101398
White Bread	7132	54096	2040	63768
Whole Wheat Bread	12528	71680	15300	99508
W. W. Wafers	14112	78400	34680	127192
W. W. Zwieback	19584	78400	5100	103084
White Zwieback	12240	84112	2550	98902

	P.	C.	F.	Total
Honey		81872		81872
Syrup.		88960		88960
Vegetables				
Asparagus	3592	3020	755	6381
Beans Field	36000	54096	4335	94431
Beans French	34128	62272	5610	102010
Beans White	38736	54656	7650	101042
Beans Lima	31536	67872	4096	103504
Beans String	3888	7504	255	11647
Beet	1872	10080	255	12207
Beet Sugar	2880	14896	1275	19051
Carrot	1728	10304	765	12797
Cauliflower	3600	5152	765	9517
Celery	2160	13216	1020	16396
Cucumber	1728	2688		4416
Cabbage Red.	2592	6608	510	9710
Cabbage White	5760	12992	2295	21047
Cabbage White	1296	5488	510	7294
Lentils	37296	59360	4845	101500
Lentils German	47520	33936	22185	103641
Lettuce Head	2016	2464	765	5245
Melon	1440	6944	765	9149
Onion	2448	12096	255	14799
Peas African	33696	64736	15300	113732
Peas Shelled	32996	64524	5843	103717
Peas Green garden	9216	13440	12750	35416
Peas small	35424	58912	8925	103261
Parsnip	1728	8064	1530	11322
Potato	3168	23520	510	27198
Potato Sweet	1440	28336	510	30286
Pumpkin	1584	7392	255	9231

Spinach	5040	4928	1530	11498
Squash	[illegible]	8624	255	8879
White Turnips	2160	3360	510	6030
Tomato	2304	2800	765	5869
Meats				
Beef Lean	27792		9180	36972
Beefsteak	27216		31110	58326
Egg Entire	20160		26775	46935
Egg White of	29376			29376
Egg Yolks of	2304		78285	80589
Fish White	26064		7395	33459
Fish Brook Trout	27648		5355	33003
Fowl				
Mutton Lean				
Oysters				
Pork, Ham				
Poultry				
Salmon				
Veal.				
Milk & Butter				
Cows Milk				
Buttermilk				
Mothers Milk				
Skimmed milk				
Cream				
Cheese Cottage				
Cheese Stilton				
French Butter				
Swedish Butter				
Milk & Cow [illegible]				

Grains	Prot.	Carbo	Fats	Total.
Barley	13120	74704	6120	95944
"Sc Russian	18288	79408		97696
Buckwheat	14400	80416	4845	99661
Corn Flint	14688	76720	12240	103648
Corn Dent	13536	76720	12750	103006
Corn Sweet	16416	70224	19890	106530
Irish Moss	31680	63056	3570	98306
Millet	15420	76384	10710	102214
Oats	15087	65296	19500	99883
Rice	9648	87920	2295	99863
Rye Winter	15840	83552	4845	104237
Rye German	20160	87360		107520
Wheat Poland	30960	69328	3825	104113
Wheat White	16704	79520	3315	99539
Wheat Dribla	19872	80864		100736
Wheat Japanese	23760	72800	4080	100640
Flour.				
Arrowroot		91800		91800
Banana	4176	87248	1275	92699
Barley	16416	79744	3825	99985
Bean	33408	66528	5355	105300
Buckwheat	12816	83216	4080	100112
Cornmeal	13968	77840	9690	101498
Graham	16848	78288	4335	99400

Balanced Bill of Fare

	measure	wt.	P.	F.	C.
Baked Beans	¼ pt.	4.4 oz	76.5	6.6	195
Rice steamed	¼	2.8	8.4	4.4	87.9
Tomato	2	16	25.6	4.8	34.0
Bread	2 pieces	2	19.6	2.8	10.14
			140.1	18.6	326.3

1.6
1.6
2.56

2.5
16
15 0
25
40.0

3.
.16
28

31.4
2.8

25.12
628
87.92

8.4
128
32
4.48

P. 23.2
5.8

F. 2.1
.5.2

C. 59.4
148
3
444
44
1776
1776
193.36

6.7
5
33.5

78.5
5
392.5
.9
5
4.5

1.6
.3
2.5
16
9 0
25
34.0

1.6
4.8
25.6

696
696
76.5.6

60
60
1.60

9.8
14
50.7
2
19.6
2.8
10.14

				P.	F.	C.
Beans (raw state)	6 oz.	1/8 pt.	—	139.2	12.6	35.64
Steamed Rice	5 oz	5/8 pt.	—	33.5	4.5	392.5
Tomato (stewed)	16	2	—	25.6	4.8	40
Bread	2	32	—	10.6	—	72
Malt Honey	5 oz.	1/4 pt	—			

	P.	E.	F.	Total
Almonds	30240	19376	139995	189611
Beechnuts	31536	14784	146370	192690
Brazil Nuts	24480	7840	170340	202660
Chestnuts (fresh)	40176	3920	156060	200156
Chestnuts (dried)	8928	47152	13770	69850
Cocoanuts	15408	83104	17850	116362
Filberts	18208	31248	129030	168486
Hazelnuts	25056	8064	159630	192750
Hickorynuts	22176	12768	171870	206814
Pecanuts	37152	27128	98420	162700
Peanuts	15840	15196	181560	212296
Pinenuts	9360	29344	154785	193489
Pistachios	32112	18256	137700	188068
Walnuts (black)	39744	13104	143565	196413
Walnuts (English)	23904	18032	161670	203606
<u>Similar Nut Products</u>				
Almond Butter	30240	19376	139995	189611
Bromose	28224	44128	61200	133552
Malted Nuts	33828	49168	70380	153376
Malt-Honey	5472	12240		17712
Maltose		84200	51000	135200
Nut Meal	40752	2016	117810	160578
Nuttolene	17424	1008	49470	67902
Protose	30672	3134	26010	59816
Peanut Butter	23616	10640	67320	101576

Beans
Steamed Rice
Tomato
Bread
Malt Honey.

Fruit	P.	C.	7	Total
Apple	576	13440		140 16
Apple dried				
Apricot				
Blackberry				
Banana				
Cherry				
Cherry dried				
Cranberry				
Currant				
Dates, dried				
Figs dried				
Gooseberry				
Grapes				
Lemon				
Muskmelon				
Nectarines				
Orange				
Peach				
Pear				
Pear dried				
Persimmons	1152	35280	1785	38217
Pineapple	576	10864	765	12215
Plum	576	20720	5	21296
Pomegranate	2165	21840	4080	28085
Prune Fresh	1152	12432		13584
Prune Dried	3312	70112		73424
Raisin	3456	69552	1530	74538
Raspberry	576	5152		5728
Strawberry	1584	7840	1275	10699
Whortleberry	1152	6608		7760

23.2 2.1 — 39.4

6

139.2 12.6 38.64

53 — 46 — 2.3

2 2

106 92

	P.	C.	F.	Total
Pea	35,721	64,864	5,103	105,689
Rye	16,443	79,039	5,103	100,586
Wheat	15,734	85,503	2,806	104,044
Breads				
Barley Bread	13,324	78,359	2,551	94,320
Butter Biscuit	16,584	89,720	3,061	109,366
Graham Bread	13,466	60,442	3,572	77,480
Graham Crackers	13,891	79,380	34,700	127,971
Granola	21,262	85,050	7,654	113,966
Grape Nut	16,372	87,386	3,497	107,255
Granose	21,829	80,514	5,870	118,214
Macaroni	12,757	87,091	165	100,614
Manna	2,963	82,441		85,134
Pacific Bread	16,584	89,720	3,061	109,366
Rye Bread	8,646	55,792	102	64,541
Rye Bread	13,182	80,854	255	94,291
Rolls	16,584	90,720	3061	110,365
Sticks	16584	90,720	3061	110365
Swedish Spice	14175	85,503	2551	102229
White Bread	7512	54,772	2041	64326
Whole Wheat	12332	72,576	15309	100217
W. W. Wafers	13891	79380	34020	127291
W. W. Zwieback	19278	79380	5103	103761
White Zwieback	12048	85163	2501	99712

	P.	C.	F.	Total
Pea	35,721	64,864	5,103	105,689
Rye	16,443	79,039	5,103	100,586
Wheat	15,734	85,503	2,806	104,044
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Pasadena Bread	16,584	89,720	3,061	109,366
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Rye Bread	13,182	80,854	255	94,291
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White Zwieback	12048	85163	2501	99712

Experiments in relation to Coefficient "Z"

	Peter Rennings.	Amt	Res	A	A'	H	C	E	Saliva Gms	Saliva Min.	M.	D.	a	b	c	x	y	z	a+x	m
1	Regular.	90	25	,280	,260	,088	,172	,126	21	4	,976	,904	1.06	,65	2,62	10	1,44	,44	1,24	1,01
2	Granose + 8 oz water 160°F {drank as hot as possible	170	30	,270	,290	,050	,240	,088	—	—	1,952	1,688	,85	,71	-	15	1,23	,24	,97	1,16
3	" + 8 " " 100°F	180	20	,310	,316	,216	,100	,092	18	30	—	—	,89	-	,50	5	1,50	,50	1,04	1,18
4	Regular + 30 gr. Salt (NaCl)	95	35	,282	,282	,082	,200	,258	11	9	1,408	,912	1,00	,61	,56	0	1.26	,43	1,05	,78
5	" + ½ oz Malt Extract	190	35	,280	,274	,096	,178	,082	18	22	,928	1,252	1,03	,52	,41	0	1,52	,21	1,45	1,15
6	" + Pepper.	65	15	,368	,338	,068	,270	,110	17	5	,992	,848	1,11	,43	1,70	0	1,54	,61	1,23	1,13
7	" massage not directed to empty stomach	85	20	,280	,332	,070	,262	,102	18	7	1,280	,840	,80	,75	1,28	0	1,50	,46	,89	1,14
8	" " directed to empty stomach	55	15	.336	,316	,204	,112	,120	25	5	,156	,264	1,17	,28	2.50	0	1,45	,72	1,30	1,08
9	" with exercise during the hour.	120	45	,334	,356	,040	,316	,086	24	8	2.368	1.932	,88	,69	1,50	15	1,25	,33	1,21	1,03
10	Clark Riggs. Regular.	35	15	.244	,302	,114	,188	,140	9	6	,992	1,088	,65	,60	,75	8	1,14	1,14	,77	—
11	Regular + 8 oz Ice water	170	85	.204	,224	,080	,144	,070	8	4½	,640	,860	,72	,53	.80	20	1,00	,24	,95	—

Water as hot as possible decreases the HCl (free) increasing the combined
See index Heat

Ice water has the same effect See also sheet 1 No 4

In Hyp Hot and cold water act opposite to Salt, lemon juice, and vinegar

Hot and Cold Trunk Pack

L. J. Weese	Amt	Res	A	A'	H	C	F	Saliva Gms	Saliva Min	M	D	a	b	c	y	z	ayz	m
Reg while Reclining	150	85	.158	.171	.000	.171	.204	26	14	2.720	1.200	.91	3.57	.92	.86	.26	1.02	.68
Hot and Cold Trunk Pack during the hr	80	30	.186	.192	.006	.186	.134	"	"	2.572	1.968	.96	.70	"	1.25	.58	1.07	.88

The same conditions in both cases. Both reclining on a cot with the room at an even temperature.

7

Nut Meal

		Amt	Res	A	A'	N	C	F	Saliva Gms	Saliva Mim	M	D	a	b	c	x	y	z	a+x	m
1	Peter Renninger																			
2	Regular (cracker)	90	25	.280	.260	.088	.172	.126	21	4	.976	.904	1.06	.65	2.62	10	1.44	.44	1.24	1.10
3	1½g Nut Meal	170	50	.310	.282	.058	.224	.118	15	4	.000	.000	1.12	.00	1.67	0	1.41	.24	1.24	1.05

For J. H. Kellogg, Battle Creek, Mich.

SOJA BEAN.

Analyses of Soja bean and plant.

	moisture.	Ash.	Nitrogen.	Phosphoric acid.	Potasium oxide.
		Ash.			
	per cent	per cent	per cent	per cent	per cent.
Soja Bean, Grain.	18.33	4.99	5.30	1.87	1.99
		Dry fodder.			
	per cent.	per cent.	per cent.	per cent.	per cent.
Soja bean, whole plant.	6.30	6.47	2.32	0.67	1.08
Soja bean, straw.	13.00		1.75	0.40	1.32

Soja bean — Food Constituents.

In fresh or air-dry material.																		Soja bean - food constituents. Calculated to water-free substance.				
Water.			Ash.			Protein.			Fiber.			Nitrogen free Extract.			Fat.			Ash.	Protein.	Fiber.	Nitrogen free extract.	Fat.
Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.					
per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent
69.4	81.2	74.8	2.2	2.6	2.4	2.2	3.9	3.0	5.6	8.9	7.3	5.8	16.0	11.5	0.7	1.5	1.0	9.5	12.0	29.0	45.7	3.8

The soja bean is planted in drills, 5 to 7 beans to the foot. The drills should be far enough apart to allow a horse and cultivator to pass along the row. The planting should be done as soon as all danger from frost is over. The soja bean is used as a soiling crop, as hay, and as silage.

Subject: Soja beans.

United States Department of Agriculture,

Office of the Assistant Secretary,

Washington, D. C.

February 18, 1896.

J. H. Kellogg, M.D.,

Superintendent, Sanitarium,

Battle Creek, Mich.

Dear Sir:-

Your letter of February 9 requesting information regarding the soja bean was duly received. The Department has not issued any publication especially relating to this subject, but I send you herewith a typewritten statement covering the analysis of the bean and plant and method of cultivation.

Respectfully,

Thos. Dabney Jr.

Assistant Secretary

(Inclosure)

Comparison of Regulars.

			Amt	Res	A	A'	N	C	F	Saliva Gms	Min	M	D	a	b	c	x	y	z	ax	m
L.J. Weese	Reg.	Jan 27, '96	.145	.070	.230	.230	.014	.216	.124	8	17½	1.504	1.096	.97	.74	.23	5	1.31	.27	1.10	.97
"	Reg.	Jan 28, '96	.160	.040	.170	.186	.034	.152	.094	28	60	1.216	1.184	.89	.63	.23	0	1.06	.25	.99	1.00
"	Reclining	Reg. Feb 3, '96	.160	.080	.202	.208	.010	.198	.134	24	60	2.496	1.562	.94	.76	.20	0	1.00	.25	.07	.91
"	"	Reg. Mar 8, '96	.150	.085	.158	.171	.000	.171	.204	26	14	2.720	1.200	.98	.57	.92		.86	.26	1.02	.68

Note the increase of M while reclining
about doubled

(One day apart)

2/23 L.J. Otis	Reclining	Reg. 2/23	.105	.050	.120	.144	~~.000~~	~~.144~~	~~.128~~	~~22~~	8	5.120	2.760	.79	.81	1.36	5	1.04	.38	.92	6
3/1 "	Regular	~~Reg. 3/1~~	.175	.050	.148	.180	.044	.136	.136	26	12	2.528	1.572	.68	.72	1.08	10	1.42	.22	.84	

Experimental work on condensed milk

BACTERIOLOGICAL AND CHEMICAL EXAMINATION OF STOMACH FLUIDS

	No.	STAINED PREP. Bac.	Coc.	Spi.	Yea.	Lep.	AGAR PLATES AEROBIC	ANAEROBIC	Bouillon 24h	48h	Gelatin 24h	48h	Milk 24h	48h	Indol 24h	48h	Injection C. C.	Result	Toxicity C. C.	Per K	NAME
1	7/26/96						(4)	odor sl sour 200			0	0	no clot								L A Hanson
2							Sour odor 24000	Sour odor 40000			acid		no clot								Geo N Mann.
3							310	1040													Direct inoc into agar.
4																					
5																					
6																					
7	7/28/96						Sour odor 2400	250			0	0	Coag								L A Hanson
8							32000	10000				acid	coag								Geo. N. Mann.
9							500	0													Direct inoc into agar
10																					
11																					
12																					
13	7/30/96						(6)	0			0	0	72 coag								L A Hanson
14							300	2				72 acid	48 coag								Geo N Mann
15							0	0				0	0								Direct inoculations
16																					
17																					
18																					
19							It may be interesting to compare with this, the test meals by Ha														
20							of other foods, a report of which I recently submitted to you.														
21																					

SIPHONED 189

State	Phys.	Time H.	Time M.	REMARKS	CHEMICAL. A	CHEMICAL. H	CHEMICAL. C
	1.			Raw milk bought	234	0	242
				on street	118	0	96
				(Anaerobes in excess in all tests)			
	2.			Sam. milk. boiled 15 minutes	236	0	240
				the night before inoc. & kept	120	0	120
				in stoppered flask			
				Aerobes in excess in all test			
	3			Concentrated Cream			
				4 oz in cold sterilized dist. water	272	28	278
				Total 14 oz of mixture made	124	0	88
				Just before test breakfast			
				with aseptic precaution			
				Aerobes and Anaerobes.			

Experiments to determine the nature of the substance found in urine after a meal — identity to the albumin excreted after other albuminous foods, and its relation to the coming and absence	Sanford Edwards														P. M. Keller												P. M. Keller											
	½# Butter	½# "	No meat food	" "	Meat butter and tea	" "	No meat food	" "	H Eggs	& "	No meat food	" "	Meat butter and tea	" "	½# Butter	½# "	No meat food	" "	Meat butter and tea	" "	No meat foods.	" "	H Eggs	& Eggs	No meat food	" "	½# Butter	½# "	No meat food	" "	Meat butter and tea	" "	No meat food	" "	H Eggs	& Eggs	No meat food	" "	Meat and tea	" "
Beginning 9/27/96 Bladder emptied just before meal — and again at time of exam	B.	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D
	Sunday		Monday		Tuesday		Wed		Thu		Fri		Sun		Sun		Mon		Tues		Wed		Thu		Fri		Su		Mo		Tue		Wed		Thu		Fri		Sat	
Urine. no of hours	5	5	5	5	5	5	5	5		9					3	5	3	5	5	5	3	3	4	4			3	3	3	3	3	5	3	3	3	3¼				
" " " cc.	210	110	300	360	240	80	380	300		300	320		220	180	110	190	150	550	210	180	150	310	310	300	180	190	90	100	150	100	250	110	130	300	180	110	90	60	180	60
Albumin. Heat test	0	0	0	0	0	+	0	0		+	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
" Heller "	0	0	0	0	+	++	0	0		+	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0
" Bumet "	0	0	0	0	0	+	0	0		0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O/o " Picric	3	0	1	0	2	1½	0	0		3/4	0		?	0	tr	0	0	0	0	tr	0	0	0	0	0	0	3/4	tr	0	0	tr	0	0	0	0	0	0	0	0	0
" " Ferrocyanide	trace	½	tr	tr	1	1½	0	tr		½	tr		0	trace	tr	0	0	tr	0	0	0	tr	0	0	tr	0	tr	tr	tr	tr	½	½	0	tr	0	tr	tr	tr	0	0
Combined Chlorides in 5cc	16.9	16.5	16.8	10.2	4.0	4.0	16.9	0		12					10.3	2.	13.5	16.9	14.6	18.5	17.1	2.2	4.6	1.8			23	17.2	6.7	21.2	14.2	4.5	8.5	2.1						
Fixed " "	38.6	26.7	26.0	13.3	36.4	21.3	35.8	36		32.5					39.2	33.2	33.7	35.4	39.7	29.	35.	41.5	35.8	15.3			42.4	34.3	40.3	33.3	36.1	32.0	41.5	41.6						
Total " "	55.5	28.2	52.8	23.5	40.4	25.3	52.7	36		33.7					49.5	35.2	47.2	52.3	54.3	47.5	52.1	43.7	40.4	17.1			65.4	46.5	47.0	54.5	50.3	36.5	50.0	43.7						
Combined " per hour	142	6	202	147	38	13	257	0		8					76	15	135	372	123	133	171	45	71	18			128	81	67	141	237	20	74	42						
Fixed " " "	324	117	432	192	344	68	544	432		218					287	252	337	779	333	209	350	858	554	153			254	279	403	232	602	141	359	832						
Total " " "	466	123	634	334	387	81	801	432		225					363	267	472	1151	456	342	521	903	626	171			392	310	470	363	839	161	433	874						
Percentage of total Chlorides which are "combined"	30	8	32	43	10	15	32	0		3					21	5	28	32	27	39	33	5	11	10½			35	26	14	40	28	12	17	½						

Fed not measured or weighed but given from dinner pail

Experiments to determine the urinary changes following the ingestion of considerable quantities of nut preparations.

Special meals given to three individuals, Edwards, Evans and Keller. - Sunday nutlose 3/4 pound. Tuesday Nut butter ad libitum. Thursday Eggs 3/4 doz. Sunday. Roasted peanuts ad libitum. No other highly albuminous foods taken during the experiment. Meals at 6 + 1.30 immediately preceded by micturition. Urine saved for 3-5 hours after meals, examined qualitatively and quantitatively for albumin, and titrated for chlorides.

(In a former series of experiments in which nutlose was freely used, a substance was found in the urine (in marked quantities at times) which, while giving no reaction to the Heat Heller or Binet test, often gave marked precipitate with Potassium ferrocyanide + Acetic Acid mixture, or Picric-Citric Acid mixture. This substance we will in this paper call proteid for convenience.)

Observations on the accompanying diagram.

1. Quantitative reaction for albumin, all negative, except those of Tuesday on a diet of nut butter + The morning urine on this day gave in Edwards case a positive reaction to Heller's test. The afternoon urine gave a very marked reaction to Heller's test, also a good Heat and Binet reaction, showing presence in this case of Serum albumin. Heller on this day also gave a positive Heller reaction in the afternoon.

2. Quantitatively, we note marked irregularities.
   (a) The Picric Acid and Ferrocyanide tests do not at all agree; first one gives a much larger precipitate, then the other. The heaviest precipitates resulted from the Picric Acid. The most frequent precipitates were from the Ferrocyanide, and were usually small in amount.
   (b) The precipitate bears no relation to the amount of nut preparation ingested. The Picric Acid usually shows more marked precipitate in morning urine, whereas the ferrocyanide shows more marked precipitate in afternoon urine.

3. Cooked nuts do not seem to produce the substance as do nutlose and nut butter.

4. Eggs give a marked precipitate by Picric and Ferrocyanide tests in Edwards case, also the Heat and Heller test thus more nearly resembling Serum albumin than any of the other cases except that of Edwards Tuesday on nut butter.

5. This substance produced by ingestion of nutlose is not Serum albumen and thus far we have not identified it with any known proteid. The variation in the quantitative reactions would indicate that it is not a simple proteid, but a mixture of two or more in varying quantities.

6. The Chlorides - Combined Chlorides were found present in quantities varying from 0 to 43 o/o. The percentage seems to bear no relation whatever to the amount of proteid food ingested or to the amount of "proteid" precipitated from the urine.

7. Variation in individuals. From these and other experiments, it seems that there is a great variation in persons considered healthy, in the amount of proteid like material which the kidneys permit to pass.

Foods	Proteid %	Fat %	Carbohydrate %	P. 15	F. 27	C. 12
Legumes						
30 Beans.	7.1	8.2	20.3	10650	8640	24360
31 String Beans						
32 Lima Beans						
33 Green Peas	5.6	.6	20.7	8400	1620	24480
34 Lentils						
Nut Foods			Total	19050		
35 Nuttose Roast	4.3	1.9	12.5	6450	5130	15000
36 Nuttose Stewed	4.3	1.9	12.5	6450	5130	15000
37 Nuttose	30	30	18	45000	81000	21600
38 Nuttolene	30	30	18	45000	81000	21600
39 Malted Nuts	23	20.4	49.3	34500	55080	59160
40 Nut Meal	30	30	18	45000	81000	21600
41 Nut Butter	16.4	26.4	9.5	24,600	71280	11400
42 Almond Cream	2.7	26.7	2.8	4050	72090	3360
43 Bromose	19.6	24	39.4	29400	64800	47280
44 Maltol	0	20	75		54000	90000
Breads			Total			
45 Whole wheat	9.8	1.4	50.7	14700	3780	60840
46 Graham	9.5	1.4	53.3	14,250	3780	63960
47 White	8.8	1.7	56.3	13200	4590	67560
48 Zwieback	13.6	2	70	20400	5400	84000
49 Bromose Cakes	15.4	2.3	79.1	23100	6210	94920
50 Whole Wheat Crackers	9.8	13.6	70	14700	36720	84000
51 Graham "	9.8	13.6	70	14700	36720	84000
52 Beaten Biscuit	11.7	1.2	80	17550	3240	96000
53 Sticks	11.7	1.2	80	17550	3240	96000
Animal Foods						
54 Sterilized Butter	1	85	.5	1500	229500	600
55 Cream	2.7	26.7	2.8	4050	72090	3360
56 Milk	3.6	4	4.7	5400	10800	5640
57 Eggs	14	10.5	0	21000	28350	
58 Junkyss	3.7	3.6	4.7	5550	9720	5640

Foods	Protein %	Fat %	Carbohydrate %	P	F.	C.
				1,500	2,700	1,200
Fruits						
1 Bananas	1.4	1.4	29.8	2,100	3780	35760
2 Oranges	1.31	0	11	1965		13200
3 Lemons	1	0.9	8.3	1,350	2430	9960
4 Grapes						
5 Pears						
6 Plums						
7 Apples						
8 Apple Sauce	.18	.24	9.4	270	648	11280
9 Stewed Prunes	.5	0	14.7	750		17640
10 Stewed Raisins	1.8	1.9	23.6	2700	5130	28320
11 Dates	.9	0	58	1350		69600
12 Peaches						
13 Canned Peaches	.7		12.5	1,050		15000
14 Berries	1.4	0	12.4	2,100		14880
15 Fruit Juice	.7	.74	9.2	1,050	1998	11040
			Totals	14,830		
Grains						
16 Rice	3	.16	81.4	41,500	432	37680
17 Oatmeal	6.4	3	29.7	9,600	8100	35640
18 Cracked Wheat	5.7	3	29.5	8550	8100	35400
19 Gluten Mush	12	.6	22	18,000	1620	26400
20 Graham mush with raisins	5.8	.9	35.8	8,700	2430	42960
21 Graham mush with dates	5.8	.9	35.8	8,700	2430	42960
22 Granola	15	3	75	22,500	8100	90000
23 Wheatose	5.7	.8	29.5	8550	2160	35400
24 Macaroni	10	.2	75	15,000	540	90000
			Total	104100		
Vegetables						
25 Potatoes	3.2	.15	27.5	4,800	405	33000
26 Lettuce						
27 Cabbage	1.6	.3	4	2400	810	4800
28 Celery						
29 Tomatoes						
			Total	7200		

Food	% Solid.	% Proteid.	% Fat.	% Carbohy.	Calories per lb. food: By Proteid.	By Fat.	By Carbohy.	Total.
Scalloped Potatoes	32.5	3.2	.15	27.6	78.	6.	491.	575.
Baked crystal wheat	36.6	5.7	.84	29.5	138.	33.	519.	690.
Rice with nuttose	36.2	3.0	.16	31.4	77.	8.	587.	672.
Oatmeal	40.0	6.4	3.0	29.7	155.5	119.3	525.2	800.
Sticks, pressbread & white zwieback.	93.0	11.7	1.2	79.6	286.4	48.	1415.6	1750.
Zwieback grah, wh. wheat & fruit and fruit crackers	87.0	13.6	2.0	70.0	329.	79.2	1231.8	1640.
Toasted graham & cream rolls.	98.3	15.4	2.3	79.1	370.4	91.	1393.6	1855.
Whole wheat bread	62.9	9.8	1.4	50.7	237.4	55.5	892.1	1185.
White bread	67.7	8.8	1.7	56.3	214.4	67.7	997.9	1280.
Graham bread	65.8	9.5	1.4	53.3	230.4	55.5	939.1	1225.
Crackers wh. wheat & graham	95.0	9.8	13.6	69.7	240.6	55.4	1258.	2050.
Butter (cow's)	89.5	1.0	85.0	.5	25.3	35804	9.3	3615.
Butter (peanut)	54.5	16.4	26.9	9.5	400.	1068.	172.	1640.
Lentil roast	20.2	4.3	1.9	12.5	104.5	75.	220.5	400.
Green peas	28.	5.6	.6	20.7	132.	23.1	354.9	510.
Graham mush	42.6	11.7	1.7	71.7	285.5	67.8	1271.7	1625.
Dates	84.	9.	0.	58.	220	—	1050.	1270
Raspberries stewed	17.	1.4	3.2	12.4	33.5	125.5	216.	375.
Prunes	15.6	.5	0.	14.7	13.2	—	266.	280
Raisins stewed	28.	1.8	1.9	23.6	45.2	78.1	431.7	555.
Grape juice	10.9	.7	.74	9.2	17.6	30.4	168.	145.
Applesauce	10.	.18	.24	9.4	4.6	11.2	174.2	190
Malted nuts 96.5	87.7	23.6	20.4	44.3	[illegible]	810	893.	2280.
Koumyss	12.7	3.7	3.6	4.7	90.3	142.7	87.	320.

	Grape	Milkbread	Bramose	Total
42.	5.3	32.3	14.	51.6
2	53	48.4	2.1	55.8
23	69.4	19.3	83.9	192.6
300	100.0	100.0	100.0	300.0
	666.	107.5	107.5	881.0

2.6	9.7	30.8	43.1
2.6	14.5	4.6	21.7
44.8	5.8	184.6	235.2
50.0	30.0	220.0	300.0
333.	32.2	236.5	601.7

Apples	Malted Nuts	White Bread	
2.	25.3	13.2	40.5
3.	21.9	2.5	27.4
95.	52.8	84.3	232.1
100.0	100.0	100.0	300.0
1000.0	107.2	149.7	1256.9
.8	17.7	25.1	43.6
1.2	15.3	4.7	21.2
38.0	37.	160.2	235.2
40.0	70.0	190.0	300.0
400.0	75.0	284.4	759.4

Apples	Maltal	Oatmeal	
	0.0	16.4	18.4
2.0	23.5	7.7	34.2
3.0	76.5	75.9	247.4
95.0	100.0	100.0	300.0
100.0	117.6	255.7	1373.3
1000.0			
.6	0.0	41.0	41.6
.9	4.7	19.2	24.8
28.5	15.3	189.8	233.6
30.0	20.0	250.0	300.0
300.0	23.5	639.2	962.7

	men		women	
P.	220,500	44.1	224,000	44
F.	186,300	20.7	143,100	15
Lo.	969,600	242.4	816,000	204
	1,376,400	307.2	1,184,100	264
	2		2	
	2,752,800	614.4	2,368,200	529

no lbs grains
" " fruits
" " fruits
" " vegetables
" " legumes
no. men
no. women

	before	after
Overweight men		
Overweight women		

Average no of days. 2 meals daily

Foods	% Moisture	% Ash	% Albumin	% Sugar	% Starch	% Fat	% Total
Crystal Wheat	2.6	2.0	15.6		79		99+
Granola	2.3	1.3	17.0		79		99+
Nut Gluten Biscuit	3.0	1.4	33.4		42	19.4	99+
Gluten No 1	3.5	0.5	19.2		75.0		98+
Sanitarium Infant food	3.0	0.8	21.0		75.0		98+
Granose	5.5	2.2	14.7		77.0		99+
Pure Gluten Biscuit	2.5	1.9	6.94		26.0		99+
Raw Gluten			74.0				
Gluten Cooked in Water at 212° F			82.0	1.3	25		
Bromose	8.3	2.0	19.4			35.0	
Soup Stock	42.9	4.3	9.5	17.3	4.0	20.1	98+
Fruit Cocoa	4.2	2.3	9.0	5.70	9.0	18.2	99+
Fruitose	4.6	2.3	2.7	41.5	4.0	6.2	98+
(Commercial) Gluten					11.4		
Nut Gluten					12.33		
Almond Meal						61.45	
Peanut meal						52.8	

E. Purlight

NEN 3496 - No

3935

Foods	No of Orders	No ounces of food	No ounces of Protein	No ounces of Fat	No ounces of Carbohydr.	No of Orders	No ounces of food	No ounces of Protein	No ounces of Fat	No ounces of Carbohydr.
			1.4%	1.4%	29.8%					
1 Bananas	360	1800	25.2	25.2	536.4	642	3210	44.94	44.94	956.58
			1.31%	—	11.					
1 Oranges	40	160	2.096		16.3	120	480	6.288	0	54.80
			1%	.9%	8.3%					
1 Lemons	18	54	.54	.48	4.48	48	144	1.44	12.96	11.95
			.5%	0%	14.7%					
1 Stewed Prunes	301	3010	15.05	0	442.41	289	2390	11.95	0	354.33
			1.8	1.9	23.6					
1 Stewed Raisins	240	2400	43.20	45.6	566.4	185	1350	24.30	25.65	318.60
			9.	0	58%					
1 Dates	66	236.5	21.285	0	137.17	133	365.75	32.92	0	212.14
			.18%	.24%	9.4%					
1 Apple sauce	566	5660	101.88	135.84	532.04	675	6750.	121.5	162.0	634.50
			.7		12.5%					
1 Canned Peaches	1212	12120	84.84	0	1515	1594	15940	112.18	0	1972.50
			1.4%		12.4%					
1 Berries	686	4802	67.23	0	595.5	887	6209	86.93	0	149.02
			.7%	.74%	9.2%					
1 Fruit juice	718	5762	40.33	42.65	530.1	741	5969	41.78	44.57	549.15
			3.%	.16%	31.4%					
2 Rice	888	7104	213.12	11.36	2230.6	814	6512	195.36	10.42	9.17
			6.4%	3.1%	29.7%					
2 Oatmeal	79	790	50.56	23.7	234.63	44	440	28.16	13.20	130.68
			5.7%	3%	29.6%					
2 Crystal Wheat	196	784	44.688	23.52	232.848	92	345	20.81	18.76	107.85
			12%	.6	22.					
2 Glutten Mush	102	918	110.16	5.50	201.96	54	514	61.68	2.084	201.96
			5.8%	.9%	35.8%					
2 Graham Mush with Raisins	71	710	41.18	6.39	254.18	188	1880	109.04	16.920	673.04
			5.8%	.9%	36.8%					
2 Graham mush - Dates	141	1410	81.78	12.69	504.78	55	550	31.90	4.950	197.90
			.7%	.7%	9.2%					
1 Sauce for Grains	186	1488	10.42	10.42	136.90	313	2601	18.20	18.21	229.29
			15%	3%	75%					
2 Granola	48	96	14.40	2.88	72.00	40	80	12.00	2.4	60.00
			3.2%	.15%	27.5%					
4 Mashed Potatoes	340	3400	108.8%	5.1	935.	325	3250	104.0	4.88	893.75
			7.1%	3.2%	20.3%					
4 Beans	295	2360	167.56	75.52	479.	329	2632	186.7	84.23	534.30
			5.6%	.6%	20.7%					
4 Green Peas	436	3488	195.32	20.95	722.	551	4408	246.85	26.45	912.46
			1.6%	.3%	4%					
3 Fresh Veg.	140	280	4.48	.85	11.20	163	326	5.22	.98	13.04
			4.3%	1.9%	12.5%					
3 Mutton Roast	272	2176	93.58	41.44	272.	452	341	15.523	6.86	45.13
		65705	1545.90	370.54	9183.63		6672 (8.75)	1902.39	547.49	9108.2
			1446.507	370.834	10683.372			1410491	561.494	11232.578

2044.768

Nuttose Stewed Tomatoes	453	3624	155.83	68.85	453	571	4568	196.42	86.88	571	
Washed Legumes	19	152	7.1% 10.80	3.2% 4.86	20.2% 30.71	19	152	10.80	4.86	30.71	
Macaroni	527	4216	10% 421.6	2% 84.32	75% 316.2	564	4512	451.2	90.24	338.4	
Soup	118	1180	.8% 9.44	.2% 2.36	1% 11.8	139	1390	11.12	2.78	13.90	
Nut gravy Toast	265	1855	6.8% 122.94	1% 18.55	35% 649.25	534	3528	240	35.28	1234.8	
Prune "	182	274	6.8% 18.63	1% 2.74	35% 95.90	119	833	56.84	8.33	291.55	
Berry "	710	5680	6.8% 486.24	1% 56.8	35% 1988	656	5248	356.86	52.48	1836.80	
Cream "	89	178	6.8% 12.1	1% 1.78	35% 62.30	91	182	12.37	1.82	63.70	
Wholewheat bread	93	465	9.8% 45.57	1.4% 6.51	50.7% 235.75	98	490	48.02	6.86	248.43	
Graham "	444	2220	9.5% 210.9	1.4% 31.08	53.3% 1183.25	466	2330	221.35	32.62	1243.74	
White "	147	735	8.8% 64.68	1.7% 12.50	56.3% 413.80	174	870	76.56	14.80	490.	
Zwieback	802	4411	13.6% 600	2% 88.22	70% 3087.7	852	3834	521.42	76.68	2683.8	
Graham Cakes	568	2272	15.4% 350	2.3% 52.25	79.1% 1797.15	846	2184	336.33	50.23	1727.54	
Whole wh. Crackers	55	165	9.8% 19.17	13.6% 22.44	70% 115.5	31	93	9.11	12.65	65.1	
Graham "	93	279	9.8% 27.34	13.6% 37.94	70% 195.3	176	348	34.10	47.32	243.6	
Passover bread	136	544	11.7% 63.64	1.2% 6.52	80% 435.2	94	376	44	4.51	300.8	
Beaten biscuits	67	268	11.7% 31.35	1.2% 3.21	80% 214.4	112	448	52.41	5.3	358.4	
Sticks	946	3684	11.7% 431.	1.2% 44.20	80% 2947.2	1373	5392	630.66	64.70	4313.6	
Nuttose	78	117	30% 35.	30% 35.	18% 21.6	147	220	66.	66.	35.2	
Nuttolene	184	276	30% 82.8	30% 82.8	18% 49.68	243	364	109.2	109.2	65.52	
Malted Nuts	345	173	23% 39.79	20.4% 35.30	49.3% 85	162	81	18.63	16.52	40	
Nut Meal	101	51	30% 15.3	30% 15.3	18% 9.18	57	19	5.7	5.7	3.42	
Almond Cream	48	72	2.7% 2	26.7% 19.22	2.8% 2	75	112	3	30.	30.	3.136
		32891	3254.92	732.71	17264.3		38574	3502.28	825.76	16868	64
			3256.22	732.75	17263.6			3512.36		19247	996

			16.4%	26.4%	9.5%					
Nut Butter	652	1304	213.85	850.77	123.88	596	1192	18.29	314.69	113.24
			19.6%	24%	39.4%					
Bromose	540	270	52.9	64.8	106.4	646	323	63.21	77.52	127.26
			—	20%	76%					
Maltol	36	24	—	4.8	18.	61	41	0	8.2	30.86
			1%	85%	.5%					
Strengthgel Butter	252	121	1.21	102.85	.60	348	174	1.74	147.90	.87
			2.7%	26.7%	2.8%					
Cream	144	292	7.9	77.9	5.9	124	248	7.10	68.22	6.94
			3.6%	4%	4.7%					
Milk	27	162	5.8	6.5	7.6	20	120	4.3	4.8	5.6
			14%	10.5%	—					
Eggs	146	1168	163.5	122.6		68	544	76.2	57.1	—
			3.7%	3.6%	4.7%					
Kumyss	94	1445	60.85	59.22	77.51	53	928	31.3	30.4	40.6
			0	0	97.8%					
Sugar	49	147	—	—	14.35	52	156	—	—	152.6
			5.7%	.8%	29.5%					
Wheatose	109	436	24.9	3.5	128.6	83	332	19.	2.7	97.9
			3%	.16%	31.4%					
Rice Nutrose	9	72	2.2	1.2	22.6	34	272	8.2	4.4	85.4
		5641	533.11	1294.14			4330	397.14	715.93	661.27
		65708.5	328.81	1294.24	637.19		6672	1902.39	547.50	91 08.2
		32891.	1545.90	370.84	9183.63		38574	3502.28	825.71	6868.64
		104240	5129.63	2397.79	27085.13		109638	5801.81	2089.19	26638.11
		65715					67552			
		30-	5235.337	2397.724	28584.22		28-	5319.93	2093.184	31161.834

P. 5129.63 × 173340 = 889170055

F. 2397.8 × 279360 = 669849408

C. 27085.13 × 123480 = 3344471852

4,903,491,815

5129 ÷ 3496 = 1.47+ ounces = P

2398 ÷ 3496 = .69 " = F

27085 ÷ 3496 = 8.08 " = C.

Average Eaten Each meal Entire

10.1

Buttermilk

P. 5801.81 × 173340 = 1955685745

F. 2089.19 × 279360 = 583644912

C. 26638.1 × 123480 = 3289272588

5802 ÷ 3935 = 1.5 ounces P

2089 ÷ 3935 = .53 " F

26638 ÷ 3935 = 6.8 " C.

Dry food

8.82

BOB

THE BANANA

Much can be written about the many excellent qualities and unusual characteristics of the banana. It yields a large number of calories per acre and thrives in the tropics and semi-tropics. Although perishable when ripe, if harvested green it may be shipped long distances. It matures throughout the year. Its thick covering, which is easily removed, protects it from contamination. The rich yellow color of the banana adds to its appetite appeal. In recent years, as a result of nutrition experiments it has been learned that it is of great nutritive and medical value in a great variety of disorders. But most of all to be praised is its delicious flavor. This alone would more than justify the huge industry which has been formed to meet the great demand. Benjamin Disraeli, the English statesmen and connoisseur of living, must have regarded the banana very highly because he said, "The most delicious thing in the world is the banana."

The name itself is of African origin. Scientifically this genus of trees, or rather, tree-like herbs, is called Musa, from its Arabic designation. The variety most widely grown is called Musa sapientum (Fruit of the Wise Men) because of an ancient legend that the sages of India reposed in the shade of the tree and refreshed themselves with its fruit. Another variety is Musa paradisiaca, its name being derived from the tradition that it grew in the Garden of Eden and was in fact the tree of the knowledge of good and evil. To this branch belongs the plaintain, which is never eaten raw but always cooked. A third group is Musa cavendishii, also known as dwarf, Chinese, or Canary. This is a favorite crop in the Canary Islands. The fruit is small.

Incidentally, Webster's dictionary gives the pronunciation as "ban-aw-na," with the alternative "banana," but admits that the latter "has become increasingly common in the United States."

From what has been said about the delectable flavor of this food the inference might be drawn that it only adds gustatory pleasure to a meal without making a worth while contribution from a nutritive standpoint. This is not true. The banana is a hearty food, containing 460 calories to the pound (edible portion) compared with 385 for the potato. It also supplies an abundance of easily digestible fruit sugar. It contains vitamins A and C, thiamin, riboflavin and niacin and eleven essential minerals. The constituents of the banana given in percentages are as follows: water, 75.3; protein, 1.3; carbohydrate, 22; fat, 0.6.

An old folk story tells of a peasant woman who was amazed at a traveler who "could blow hot and cold with the same mouth." He blew on his cold hands to warm them and on his hot soup to cool it. The banana is similarly remarkable because it is used both to combat overweight and underweight, diarrhea and constipation. Scores of articles have appeared in medical journals telling of its beneficial effects in a great variety of ailments. It has the cardinal virtue of being extremely digestible. Formerly, however, it had the reputation of putting a heavy burden on the stomach and of being tasted some time after eating. These disadvantages were found to be due to either eating the fruit before it was ripe or to improper mastication or both.

That this bad reputation was undeserved has been further proved by the widespread use of the banana in infant feeding. Several decades ago when it was first given to babies with celiac

disease, there were exclamations of horror. This malady is a chronic form of intestinal indigestion. But specialists in various parts of the country before long were reporting excellent results from banana feeding. Babies from six weeks to two years of age were fed the mashed and sieved pulp of thoroughly ripe bananas. There were no digestive disturbances and the gains in weight and general condition were most satisfactory. At the New York Foundling Hospital it became the routine practice to give bananas as the first solid food.

The use of powdered banana as added carbohydrate in the milk formula is widely advocated for both well and sick infants. Mashed, sieved pulp may be fed separately in amounts varying from one teaspoonful to a whole banana daily. The banana formula because of its thickness is not likely to be vomited. It is hence well adapted to being given in small amounts at frequent intervals to infants who are weak, without appetite and fail to make satisfactory gains in weight. It is particularly useful in premature and malnourished babies who cannot digest most fruit juices. One authority found that when the pulp was fed separately from the milk formula, the more underweight the infants were the greater the average weight gain. Those more than fifteen per cent under weight made average gains of 4.2 ounces weekly, which is more than that made by normal infants. Children with scurvy were cured with no other remedy than two sieved bananas daily. X-rays showed that the long bones were healed in four months. Favorable results with chronic eczema are reported from the feeding of three bananas with sugar or honey every day.

Formerly it was thought that raw fruits should be avoided in diarrhea. Dr. Kellogg employed a dietary consisting largely

of fruits nearly half a century ago. It was found that the acute digestive disturbances accompanying this disorder, which are so frequent and debilitating in infancy and early childhood, could be treated with bananas alone, orange juice alone, scraped apple alone, or all three together. This dietary was used successfully in infants only ten months old. The apple cure was widely employed. Some physicians found the banana regimen superior to all others. They ascribed the favorable action of bananas chiefly to their content of pectin, which swells to give voluminous soft stools, thereby cleaning out the intestine and removing the bacteria causing the trouble. The high percentage of carbohydrates in bananas and apples, with low fat and protein, promote more favorable intestinal conditions.

Constipation is of course very common among both children and adults. Among common causes of this condition are lack of sufficient fiber or vitamins in the diet, insufficient moisture in the intestinal contents for lubrication, or spasm of the colon due to irritation (spastic constipation). Numerous investigators have shown that vitamins play a part in maintaining the lining of the alimentary tract in good condition and resistant to infections. Thiamin has a specific relation to appetite and probably also to normal muscular tone and activity of the intestines. Bananas supply fiber, pectin and vitamins which seem to aid normal functioning of the colon. This fruit has been successfully used in many cases of constipation. Careful tests showed the banana to have greater laxative effectiveness than apples, though less than prunes.

Many years ago, Henry M. Stanley, the African explorer, had two attacks of gastritis and the only food he could digest was a gruel made of banana flour. In typhoid and other acute fevers of children the banana diet gives very satisfactory results. Peptic ulcer (stomach or duodenal) has become extremely prevalent, being somehow linked, apparently, with intense living, both in work and play. To promote healing it is desirable to protect the mucous membranes from mechanical irritation and from acid gastric juice. Alkali powders are sometimes given to neutralize excess secretion of acid. The tendency now is to place greater reliance on diet and less on medication. Bananas are now widely used in this condition, up to six or even nine daily. Many patients with chronic ulcers find that this is the only raw fruit they can eat without subsequent distress. Fortunately most people can eat bananas daily without tiring of them. Incidentally, children with poor appetites generally like bananas.

Allergic persons are most likely to be sensitized to wheat, milk or eggs or all three of these foods. The banana is an excellent food in such cases. Rye seldom causes allergy and is an acceptable substitute for wheat-sensitive persons. Many wheat breads contain some milk or eggs. A banana rye bread has been devised which is both palatable and nutritious and is free from allergic substances.

In cases of pellagra, sprue and anemia, the banana diet has been given with satisfactory results. Its vitamin content is probably the reason for this. Sprue has been cured by eating daily ten to fifteen bananas. It has been established that the iron of bananas is utilizable for the formation of hemoglobin.

Because of the high caloric value of the banana and its low protein content it is especially valuable in the treatment of cases of acute inflammation of the kidneys, in which protein may have to be reduced yet sufficient nourishment given to maintain good nutrition. Bananas have for a generation been recognized as suitable in diabetes. In gout they increase the uric acid solvent power of the urine. With skim milk they have been widely used in weight reduction.

Paradoxically, the banana is also employed when rapid gain in weight is desired. One hears of this chiefly when a man wants to get into the Army in war time but is barred by being too thin. Just before he is to be examined he fairly stuffs himself with bananas. Because of their great palatability he can get them down in amounts which would be impossible with any other food.

The wish is sometimes expressed, "I would like to eat bananas in the tropics where they have ripened on the trees." As a matter of fact, you would be disappointed. Even for home consumption there they are always picked green and allowed to ripen later. If they become mature on the tree they lose their delicious flavor and become insipid. Besides, the skin bursts open and insects make a quick entry. After being severed from the tree, bananas continue to grow, drawing sustenance from the stalk. Thus the starch content is turned into easily digested sugar. If the fruit is only partially ripe this change into sugar can be accomplished by cooking. The banana reaches its ideal state when the skin is flecked with brown.

Much publicity has been given lately to the advice, "Do not keep bananas in the refrigerator." They ripen more satisfactorily if allowed to do so at room temperature. However, there

are circumstances in which the housewife is compelled to disregard this advice. If bananas can be bought only at intervals and hence must be taken in quantities to last a week, perhaps, maturing can be slowed up by refrigeration. With proper care the bananas can be removed to room temperature at just the right time to insure satisfactory ripening.

The raw banana is so delicious that there seems to be little justification for cooking it. Certainly the flavor is not improved. Variety in diet, however, has strong attraction for many people. When the tip is still green the banana may be baked, broiled, fried or served as a vegetable or entree. Baking may be done in the skin or after its removal. The banana is an excellent ingredient in a vegetable plate. It can be served with cereals, in fruit cups, salads, sandwiches, custards, gelatin, pies, ice cream and sundaes.

There is much that is interesting about the history of the banana and modern methods of growing and transporting and distributing it. Cultivating it has been an enormous factor in improving social, educational, health and economic conditions in the Caribbean countries from which the United States draws its supplies. The plant apparently originated in the humid, tropical regions of Asia and has been used as food for man from time immemorial. It is known that the armies of Alexander the Great feasted on it the fourth century B. C. Arabs carried the plants from India to the Holy Land and Africa. The Canary Islands were the next to receive this blessed gift of nature. From there the roots were carried to the island of Santo Domingo not many years after Columbus discovered America. Much improvement in the

fruit was made by hybridization. The edible varieties do not usually produce fertile seeds. In southern Asia and the Philippines hard seeds sometimes appear. Musa textilis, from which manila hemp is derived, bears an inedible fruit which resembles the banana.

The first shipments of bananas to this country came from Cuba to New York early in the nineteenth century. Only small quantities were shipped and at infrequent intervals. Regular shipments began in 1872 when Minor C. Keith, a native New Yorker who was engaged in railroad construction in Costa Rico, shipped a cargo of bananas to New Orleans. The public took to the novel food with alacrity and Keith enlarged his business greatly, procuring supplies not only in Costa Rico but also in Nicaragua, Honduras and Columbia. Quite independently, Captain Lorenzo D. Baker, of Cape Cod, began to bring the fruit to Boston from Jamaica. He landed his first regular cargo in good condition although the stormy voyage lasted seventeen days. Jamaica was in bad economic straights owing to the depression in the sugar market. Baker's trade grew so rapidly that the island soon enjoyed considerable prosperity. Since then the business impact on the Caribbean region of the banana has been so great that the term "banana republics" is often applied to the nations there.

In 1899, the Keith and Baker interests joined to form the United Fruit Company, with headquarters in Boston. Other concerns were absorbed from time to time and the corporation has become a giant. It has had vast influence on the countries with which it does business. Not only has it distributed millions of dollars in them but it has been responsible for many sanitary, educational, social and economic improvements. The establishment of schools,

hospitals, roads, railroads and other civilizing influences was of course dictated by business reasons in the main, but the humanitarian motive certainly was not lacking. This is particularly true of the founding of a college of agriculture in Guatemala.

Raising bananas is highly scientific work and the United Fruit Company has expended many millions on research. Every useful mechanical device has been used not only in the growing of the crop but in its distribution by ship and rail to the consumers in the United States. The plant may reach a height of thirty feet, although eighteen to twenty-five is more common. Each tree bears a single bunch, which is made up of so-called "hands" or clusters, usually numbering from six to nine. Each hand contains from ten to twenty "fingers" or individual bananas, sixteen being about the average. First sight of a growing bunch generally causes surprise, since the bananas point upward instead of down as they are hung in stores. Elaborate precautions are taken to make certain that the fruit reaches the ship at exactly the right stage of its development. On the voyage the proper temperature must be maintained and ventilation provided.

The United Fruit Company employs a large fleet for carrying on its trade. The ships have splendid accommodations for passengers. The War of course disrupted business and a number of vessels were lost. Many new boats are now in service again. Large shipments were made to Britain and the continent before the War and are now being resumed. These came not only from the Caribbean region but from Africa, Brazil and the Canary Islands. The chief exporting countries are Jamaica, Mexico, Honduras, Guatemala, Columbia,

Guadaloupe, Panama, Cuba, Costa Rica, Haiti, and San Domingo. By this diversification of its sources of supply the United Fruit Company is assured of abundant crops even if plantations in some countries are damaged or ruined by hurricanes, droughts, pests or from other causes. The largest proportion of bananas eaten in this country pass through New York and New Orleans, with smaller amounts arriving in a dozen other ports.

613.2

Lecture No. 9.

~~Bread made~~ light by means of Fermentation.

If we give careful heed to all the points given last week we can manufacture a great many good articles by the process of fermentation. Chief among these is bread. To make good bread three things are essential: good yeast, good material, and good care. It is very important that the material be measured correctly. Many housekeepers spoil their bread because they guess at the amount of material they want to use. Even if they measure the liquid all right, they add more or less flour at different times so that the results will be variable. Different brands of flour will cause some variations, but if we keep in account the approximate amounts needed, after one or two trials we will know the exact amount required..

It is estimated that one hundred pounds of flour will make one hundred and fifty loaves of bread. In general we find that one scant measure of liquid requires three heaping measures of flour. There will be some variation in the amount of flour required depending upon the liquid. Bread made with water requires more flour than bread made with milk. Bread made with whole wheat or graham flour requires less than that made with white flour. What has been said with regard to measuring flour applies also to the measuring of yeast. Many people use to great a quantity of yeast. In general, one cup of home made yeast or one half cake of compressed yeast is quite sufficient for four or five loaves of bread. I have known persons to make thirty loaves from one cake of compressed yeast. A small amount of yeast will start the fermentation for a large mass of bread. When compressed yeast is used, a portion of the liquid should be reserved in which to dissolve the

yeast, and when home made yeast is used the liquid should include the yeast. As to whether water or milk should be used as the liquid, it depends upon the preferences of different people. As far as economy is concerned there is very little difference. The greater quantity of flour that is required for the water bread quite offsets the cost of the milk for the milk bread. If milk is used it should be sterilized before using.

Temperature is an important point in the making of bread by this process. The bread should be started at a luke warm temperature, and all the flour that is added during the bread making process should also be warm. The bread during the entire process should be kept at an equable temperature. It will not do to allow bread that is undergoing fermentation to rise to a temperature of 80 degrees and then fall to a temperature of 60 degrees. The results will not be good. A rather low temperature is much better than a variable temperature. The golden mean of temperature is about 75 degrees. I know of no process in cooking where a thermometer is needed more than in making bread. There are numerous methods of carrying on the process of fermentation in bread, all of which have their own merits, but the process which will prepare the bread the quickest is perhaps for some reasons the best. Yeast acts better in a thin batter than in a thick mass, hence most housewives begin their bread with a sponge. Others introduce the yeast into a batter making the whole thick enough to knead, and allow it to rise in the form of a dough. By either of these processes a nice fine loaf will be produced if proper care is given to it in other directions. If a sponge is used, it is customary to allow it to rise three times, but if the yeast is introduced into the dough it is usually allowed to rise but twice. A thin sponge has sufficiently fermented when it appears foamy and effervescent throughout. A thick

sponge is sufficiently fermented when it has risen to twice its first proportions. The bread when kneaded and formed into loaves has risen sufficiently when it it twice its original bulk. The object of kneading bread is to diffuse the yeast cells uniformly throughout the mass, and unless this is done more of the yeast will be concentrated in one point than in another and the excess of its action at these points will produce holes in the bread. The dissemination of the yeast should be sonthorough that every little atom of flour will have its corresponding yeast cell. This can be done by other processes than kneading, such as stretching, pulling, or chopping. These methods may be just as good as kneading. Bread is sufficiently kneaded when it will work clean of the board, and when pounded with the fist it will bound like a rubber ball. Many people spoil their bread during the kneading process by adding too large a quantity of flour, thinking that this is necessary to keep it from sticking to the board. The secret of kneading bread is to keep it in constant motion, and to knead it with the palms of the hands and not indent the dough with the fingers. If a large quantity is to be kneaded it is better to divide it and knead it in portions. When thoroughly kneaded it should be moulded into small loaves. It is much lighter and better when baked in small loaves. It should be baked in single loaves also, each loaf in a single pan. The best pan for baking is what is sometimes called a brick tin, because it is about the shape of a brick, made of Russian iron.

The heat of the oven is a most important consideration in the baking of bread. The objects to be attained in baking are to rupture the starch and gluten cells, to check the growth of the yeast plant so that fermentation will be stopped, and to fix the little cells which have been made by the carbonic acid gas. To accomplish this in the best possible manner, the loaf must be surrounded by a temperature

ranging from 360 to 500 degrees. 360 to 400 are the temperatures usually given. The oven ought to be one in which the heat is equal on all sides. It should be hotter at the bottom than at the top. The old fashioned brick oven is the very best. The fire should be sufficiently hot to keep an even temperature without replenishing for at least an hour. If the heat of the oven is not sufficient the fermentation will not be checked soon enough, and the cells formed by the gas will not be firmly fixed so that they will collapse and the moisture will not be evaporated, and the result will be a wet, pasty loaf of bread, and not infrequently a sour loaf. If the heat is too great, it will be baked before it is sufficiently risen, or it will burned on the top, and this burned portion acts as a nonconductor so that the heat cannot permeate to the centre, and the result will be a loaf with a burned crust and a doughy interior.

Different authorities give different ways for testing the oven. The best way is with a thermometer, but this is not always practicable. The next best method is to put a spoonful of flour into the oven, and if the temperature is right the flour will b e nicely browned in ten minutes. One hour is the time required for the proper baking of bread. It is best to divide this time into thirds, and for the first third allow the heat to increase a little, for the next third allow it to remain steady, and for the last third it should recede. If the heat of the oven is too great, the bread may be protected by covering it with a clean paper. No drafts should be allowed to strike the bread. When done the crust of the bread should be an even brown all over the top. It is a great deal better to allow the bread to bake ten minutes too long than not to bake it enough. The common test is to tap it on the bottom with the finger, and if it is done it will give a hollow sound, if not it will produce a heavy sound.

Graham and whole wheat flour bread are more difficult to make than white flour bread. A person should not undertake to make these breads without first being thoroughly used to the making of white flour bread. They contain more of the nitrogenous elements which are more easily fermentable, and for this reason they are much more apt to sour than white flour bread, and consequently require much more care by those who are not experienced in the making of them. Graham flour bread is much better if a one-third proportion of white flour is used. It also requires a hotter fire and a longer baking. Most people serve their graham bread underdone. A test for good bread made by fermentation is that it should be easily crumbled. Another test is that when pressed with the thumb and fingers it shall rebound to its original shape. If it is so moist that it will not crumble it is not easily digested. Youncan test that point for yourself by placing some of each kind in a glass of water and watching the action of the water. That which is stale will be acted upon much quicker. The gastric juice will also act upon it much more readily. For this reason new bread is not wholesome. Another reason why new bread is not wholesome is because it contains some of the yeast plant so that it easily starts up fermentation, and because the digestive juices cannot act upon it so readily the yeast germs have a chance to develop.

Recipe for making bread with white flour by the quick process.

Take one quart of luke warm wetting, into which dissolve one cake of compressed yeast. Into this stir flour enough to make a dough thick enough to be lifted from the bowl with a spoon. Knead this very thoroughly for twenty minutes or longer, then put it into an earthen bowl, cover and set it in some place where it will be of an even temperature. Different means are resorted to to secure an even temperature. Some cover it with a blanket, and some have different kinds of bread raisers

613.2

UNFERMENTED BREAD.

The history of bread is as old as the history of the race. Bread is one of the first foods mentioned in the Bible, and that it was a food upon which great dependence was placed, is shown by the fact that if the people were disobedient and stiffnecked, the lord threatened to break the staff of their bread. "I will increase the famine in the land, and will break your staff of bread." The bread of the ancients, was, however, a more simple article than is most of the food called bread in these days, grain or meal mixed to a dough with water and baked in thin cakes of some sort was probably the most universally used. The Egyptians made their bread of part crushed grain and meal. A very ingenious device for baking bread in the olden time was an oven shaped something like a pitcher, in which a fire was built, and when it was hot the dough was thinly plastered upon the outside of it. As soon as it was baked it fell off in scales, and was then ready for use. Such bread of course was brittle and too hard to be cut with a knife, hence the common method of dividing was by breaking the bread, a method frequently mentioned in the Scriptures. Bread raised with a leaven, a piece of fermenting dough, was not unknown, but it was not as commonly used as unleavened. In many parts of the world even at the present day bread raised with a leaven or with yeast is seldom seen or wholly unknown. Unquestionably for several reasons unfermented bread is the most wholesome, although bread made light with yeast is perhaps under many circumstances the most convenient. Unfermented bread as usually spoken of includes all forms of bread made light without the aid of yeast, but I will qual-

ify the term by saying I have reference only to unfermented bread made light without the use of yeast or chemicals of any sort. The common practice of making bread light by the use of such substances as saleratus, soda, cream-of-tartar, tartaric acid, etc., is the source of much injury to the digestive organs. Saleratus and soda are by nature alkalies. Soda is made from the ashes of marine plants, and in its crude state is known as sal-soda, refined and cleansed from impurities it is the bi-carbonate of soda used for cooking. Saleratus is prepared from pearlash or purified potash. All alkalies, pure and strong, are powerful corrosive poisons, eating the coating of the stomach perhaps quicker than any other poisonous agent. When used with acid in proper proportion soda and saleratus lose this poisonous property. The alkali unites with the acid and forms a neutral salt, and in combining liberates carbonic acid gas, made by the process of fermentation. Now if the alkali used were thus always neutralized by the acid we might have less fogey against its use, but we all know very well if we stop to consider, that this is very rarely the case. If we had soda and cream of tarter of exactly the right strength, two teaspoonfuls of cream of tarter would doubtless exactly neutralize one of soda, but the majority of housekeepers are so careless in measuring that the most of them would fail to be sufficiently accurate, so but that a little too much of either the acid or the alkali would be used. It is exceedingly important in making these articles that accuracy of measurement should be maintained, not only in quantity but in quality. We may be able with care, to

to measure quantity exactly, but we cannot so easily measure quality. Both the acid and the alkali are subject to deterioration in strength from various causes, and the soda may be strong and the cream of tartar very weak from long standing or from adulteration, and the amount, which, if both were of equal strength, and the measurement accurate, would be just right, may, because of one or the other being of poor quality, be all wrong. Especially is this likely to be true where sour milk is depended upon to furnish the acid, for we all know that sour milk varies greatly in acidity. Cream of tartar is so commonly adulterated that it is almost impossible to find the pure article. We cannot safely use these articles unless we have some facilities for testing the strength of both acid and alkali, and of determining with accuracy the exact amount of one that will neutralize the other. Baking powder, which, when pure, are really soda and cream of tartar mixed, are perhaps a little safer to use because they offer more accurate proportions than the housekeeper is apt to get when measuring with a teaspoon, but their ingredients are subject to the same deterioratinn influences as are soda and cream of tarter when used unmixed, and unscrupulous manufacturers do not hesitate to adulterate baking powders with all manner of harmful substances. Alum is largely used in place of cream of tarter in baking powders, and alum is of itself a much more injurious substance. Indeed I might well say it is used in the majority of baking powders. Out of 138 different brands of baking powders recently analyzed, not one was there but was adulterated. These chemical substances are unusable in the body and must be carried off through the liver

and kidneys, which imposes an unnecessary burden on these organs. It has also been determined by experimentation as stated in the Gov. Chemist report, that all baking powders have the property of retarding digestion. The very best baking powders are decidedly harmful and the sooner their use is generally discarded the better it will be for the stomachs of the next generation.

These substances are not needed for the production of good light bread. We use these chemicals in order to obtain a gas to lighten the bread, but air is a gas much cheaper than carbonic acid gas, and when introduced into bread has the property of expanding when subjected to heat, and in expanding of puffing up the bread and making it light as well as does carbonic acid gas.

For the production of aerated bread we must have good materials to work with. Much of the poor cookery to be found upon the tables of the land is in a great measure due to the materials and utensils; in fact I might say to the entire cooking machinery which is not at all what it should be. Aerated bread may be prepared either in a batter or a stiff dough. As to material the term good should cover a broad range. It should be good and pure of its kind and it should also be good as regards its nutritive value. Most breads are made of the flour and meal of some of the grain, and that of the wheat is considered best for general use. Wheat contains all the elements of nutrition in were nearly the correct proportion than any other grain, and bread may thus contain it, but in order to do so it must be prepared of the entire

wheat grain, since the different food elements are not distributed uniformly throughout the wheat berry, but are to be found in different sections, the entire central portion being almost wholly starch. The starchy portion is much the softest, and is for that reason much more easily pulverized, and by the old fashioned method of milling the starchy parts were ground to a fine powder, while the more flinty gluten like portions were but coarsely broken, and as the gluten was also darker in color, and whiteness was considerd the great desideratum in a loaf of bread, the miller used to sift out the white portion and sell it as extra superfine white flour while the richer gluten he called shortsnor pollards and sold it to farmers to feed their cattle. White flour has little also than starch in its composition, and people living upon bread made from white flour are lacking the other essential elements to be found in the wheat berry. White flour bread used alone will not sustain life. Experiments with lower animals have shown that animals fed upon white flour bread soon starve and die as if they had no food at all. The reason people do not die under a regimen of white flour bread is because they obtain the other foodelements in somemother article of food they eat, but that a starvation process is going on from this cause is attested by the early decaying teeth, neuralgias, and other nerve, bone and stomach diseases so common around us. Improved milling processes have rendered it possible in these later years to secure a fine flour of the entire wheat berry. There are two kinds of entire wheat flours to be obtained. One is chushed bran and all and is called

graham flour, the other has the bran first removed by a special process and is then pulverized, and this is what is commonly known as entire wheat flour, wheat berry flour, whole wheat flour, etc. Many other kinds of flour like the new process flours, so called gluten flours, etc., contain a much larger percentage of the wheat elements than do ordinary white flours. A whole wheat flour will be necessarily somewhat dark in color, but although we cannot secure a flour of the entire wheat without its being darker in color than white flour, we must not take color as the only criterion since many unscrupulous dealers manufacture what they sell as whole wheat or graham flour from inferior brands of white flour and bran. Good whole wheat or graham flour cannot be distinguished from a spurious article by taking a little in the mouth and chewing it. If genuine it will have a decidedly nutty flavor and will produce a goodly quantity of gum as will the wheat kernel when chewed.

All breads whether fermented or unfermented, are lightest when baked in a small form, and particularly is this so with regard to unfermented breads. For this reason batter breads are best baked in small dishes or cups. Such baking cups are obtainable in various shapes, ordinarily the most shallow are preferable and result in lighter bread. The heat of the oven will need to vary with the kind of bread and the materials from which it is made, but it will need to be sufficient to form a slight crust over the

entire surface of the bread very soon after it is placed in the oven before air in the bread has escaped. For this reason the cups in which the bread is to be baked need to be heated more or less that the baking process may more quickly begin after the bread is introduced in the oven. In short, every device must be resorted to to keep the air from escaping before it has made the bread light by expanding within it.

In making the bread it is important that all materials be in readiness before beginning the work of putting bread together, as if we stop to do something else after beginning the work we lose all we have gained, for while we leave the bread the air will escape. To get the air into the bread we beat the batter, nor stir it. This beating musr also be continuous and not interspersed with any stirring other than to scrape the dough from the sides of the dish.

The liquid to be used depends somewhat upon the convenience of the user. With Graham flour, milk or water may be used; with whole wheat flour, the best results will be obtained with whole milk- that is, milk containing its natural proportion of cream, or skim milk with one third cream. For the novice it will be found best tobegin making these breads by using in the bread the white of an egg to help catch and keep the air. The white of an egg is viscous and glue like, and when beaten it catches and retains several times its bulk of air, and of course incorporates this air into whatever it is introduced, thus making it also light. After one has become thoroughly accustomed to making unfermented breads

the egg may be dispensed with, without failure, if desired.

The lightness of bread is not only dependent upon the amount of air contained wit in the loaf, but the temperature of that air, as the coldness the air the greater will be its expansion. For this reason the material used is preferably as cold as obtainable. We have had excellent success with breads prepared and left on the ice for an hour or two, or even all night before baking, by which the entire mixture becomes ice cold.

The heat of the oven should be greater for breads made without egg than for those prepared withnit. The same is true of the irons. If with the eggs the oven or irons are too hot the result is apt to be a large hold in the middle. If the oven is too cold the air escapes before a crust is formed, the result will be heavy solid bread. If justright the result will be a light porous bread, easily friable and in every way wholesome.

A little experience will make one familiar with all the conditions. In fact it is experience that must be gained after all that can be said, both regarding fermented and unfermented breads, before success is assured.

Demonstrate the process of making whole wheat, graham and corn puffs.

613.2

Unfermented Breads made light without the use of chemicals prepared first into a dough, are when well made for some reasons the most digestible of all breads. They have not the appearance of lightness and porosity which characterizes the batter breads although if well made they are by no means heavy and solid but they are more dry and crumble more easily. Batter breads are next kin to yeast breads in lightness and texture but are more easily digested because they contain no yeast germs but neither are quite so digestible as the dryer breads made from an airated dough. The bread to be made from dough must be made light by kneading or pounding to incorporate air . The process is a more laborious one and the time required for making such bread is longer than is needed for batter breads.

Unfermented dough breads made with flour and water are among the oldest form of bread. The Jewish Passover bread was of this character. It is made of flour or meal made into a dough with gun powder water. It is thoroughly kneaded and run between rollers into very thin sheets, which are perforated with a pronged steel, so that air holes may be seen in the baked cakes. They are then cut into a round cake and baked. The cakes as made at the present day and doubtless they are but very little if any difference from those made in the olden times are round thin cakes about four feet in diameter somewhat browned and covered with air holes on its surface, about eight cakes weigh a pound . The cakes are very brittle and their pieces are ground into a

fine meal which is used in place of flour during the Passover. I have been much interested in the account which Thorean in Walden gives of his experience and appreciation of unfermented bread. I will read it, For those who are unacquainted with Thorean I would explain that he was an eccentric and talented author who tried the experiment of living alone in the woods of Massachusetts on the Shores of Walden Pong a mile from any other habitation for two years or more for the purpose as nearly as can be judged of determining how few of what we call necessaries of life we are really dependent upon for health and happiness.

Points to be observed in making dough breads as in the making of batter breads. The material of which it is to be composed should be of the best possible quality and the colder it is the lighter will be the bread. The work of putting the material together should be continuous after it is begun. The oven should be in readiness, and the bread should be gotten into it with all possible despatch when once it is sufficiently aerated, much of this sort of bread is spoiled by the slowness with which it is shaped after it is well aerated. If for any reason it must be left before baking it should be placed on ice. This makes the air within in the bread colder than the surrounding atmosphere and less likely to rise from dough than if it were left in a warmer temperature. To incorporate the air the dough should be well worked, but the length of time will vary with the strength of

the kneader and the temperature of the material. As far as my own experience goes I have succeeded in making even a better bread of some forms by working the dough but a few minutes and placing it on ice until thoroughly chilled than by working it for half an hour with warmer material. Temperature is an essential point and if the bread can be made of coldest material and worked on a marble slab it is more likely other things being equal to be a success. While in kneading fermented bread lightness of touch is generally considered best probably because weight would have a tendency to crust the yeast cells, in making unfermented bread the firmer the kneading if continuous the better has been my observation. As with the batter breads this form of bread also unless rolled in very thin sheets best baked in some small form as in rolls, sticks, cubes or biscuits. The best utensil for baking such breads is something perforated which will admit the circulation of the heat air to all sides of the bread at the same time so that a crust will form over the whole before the air has had a chance to escape. For the same reason the little biscuits or rolls should be placed so far apart on the pan that there will be no possibility of their touching each other. The best baking pan is the perforated sheet. Perforated pie tins are equally good though by no means so convenient to arrange in the oven, they, however, perhaps admit of more despatch in baking the rolls after being formed as the tin as soon as full may be placed in the oven while a second one is being filled. If one has neither the perforated sheet nor a pie tins , the upper oven grate is

better for baking than ordinary tins because it admits of more circulation of heat under the bread. Dough breads as before stated are prepared in several forms. A dough made of flour and ice water well kneaded then rolled very thin, cut into shapes and baked constitute a brittle bread which we call crisps. A less brittle but more tender bread may be made in the same manner by using rich milk or cream in place of ice water. This bread is of course more generally considered toothsome but it does not possess rich flavor with the ice water.

A dough prepared by carefully incorporating the water with the flour, so as to litterally form layers of dough which can be done by having the flour in a bowl and pouring the liquid in slowly and mixing each addition of liquid first to a dough before more is added, and placing these little pieces of dough each to one side while more is being formed, after ward gathering the whole together and kneading it well, may then be shaped into rolls in this manner and cut to any desired length. The rolls may be made larger or smaller but those the smallest size are apt to be the lightest though of course they possess more crust. Neverthe less the crust of all breads is the most digestible part as the starch in it is by the heat of the oven more completely changed into dextrine than is the starch in the interior of the bread. People accustomed to the use of soft breads often find it requires a "getting used to" before they enjoy the harder breads of any sort but such are the most wholesome for various reasons. They necessitate more thorough

mastication hence are more likely to be thorpughly insalivated.

The question may arise in some minds with regard to the method given of putting the rolls together, why it would not be just as well to put the liquid all in at once and mix it all up together. My theory is that the layers of dough when thus prepared and gathered together afterward carry more or less air with them between each layer thus rendering the dough lighter than when the liquid is turned in all at once and the whole mixed together. There is another way of accomplishing the same result and for some it might be considered easier, and that is to beat the flour into the liquid very slowly as directed for batter breads until stiff enough to knead. Another form of bread is aerated by pounding or beating with a hammer or a mallet. The dough may be put together in the same manner as for rolls, beaten thus- when sufficiently beaten it may be shaped into biscuits thus-

The difference between rolls and beaten biscuits when properly made is not only their shape but their consistency. The beaten biscuit is the driest of all breads with which I am acquainted or should be when properly made'. The amount of flour usually required for rolls is three times the quantity of liquid used while for beaten biscuits we strive to incorporate four times as much flour as we have of liquid. Something of course will depend upon the liquid used the rule holding good with unfermented as with fermented breads that breads made with water require more flour than those made with milk. Whole milk or thin cream are the most commonly used for beaten biscuits while rolls are made

with ice water, milk or cream or a combination of liquids. For beaten biscuits whole wheat flour gives perhaps the best satisfaction while rolls and sticks of graham are generally preferred.

The oven temperature for baking rolls and biscuits should not be so hot as to brown them in the first fifteen minutes. The thinner and smaller the bread the hotter the oven will need to be. The beaten biscuit when properly made is one of the most easily digested breads . It is also a bread which will keep for a longer time in perfect condition and perhaps I ought to add right what no doubt you will be ready to admit after a trial at practicing that requires a considerable more work to make it than do other unfermented breads. Nevertheless no good thing is obtainable without labor and why should not the best things be hardest to secure.

613.2

UNFERMENTED DOUGH BREADS.

Most ancient breads were unleavened cakes of some kind. Two centuries before Christ, Marcus Porcius Cato put in writing a recipe for bread which was the one probably in use at that time. It read:--Make kneaded bread thus: wash your hands and trough well. Put the meal into the trough, add water gradually and knead it thoroughly. When you have kneaded it well, mold it and bake it under cover.

Our Anglo Saxon ancestry lived principally upon bread baked in round flat cakes which the superstition of the cook marked with a cross to preserve them from the perils of the fire.

At the present time the bread used by the largest proportion of the laboring classes of the old world is some form of unleavened bread. In northern continental Europe fermented bread is almost unknown save in the homes of the very wealthy or the nobility. In portions of Norway where unleavened cakes is the common form of bread they are baked in immense quantities but once a year. Several days are spent in making the cakes which are rolled thin in large circular form with a corrugated rolling pin--and when done are stacked from floor to ceiling in a room purposely arranged for their keeping.

The native Mexicans make for their chief bread a kind of thin unleavened cake from corn, termed tortillas. Various tribes of American Indians make for their daily bread a similar article from wheat, which they first spread on cloths and dry in the sun. Then, between a stone alsb and a roller, they grind it ~~in this manner~~, into a very good variety of graham flour. The flour is then mixed into a dough with water, carefully kneaded, partially flattened on a board, then thinned by passing from one hand to the other, after which it is baked on a stone over

a wood fire ~~as shown in the model~~.

Unfermented dough breads made light without the use of chemicals are, when well made, are in some ~~points~~ respects the most digestible of all breads. They have not in appearance the porosity which characterizes the batter breads although they are light, but are more dry and much more friable. Batter breads are in texture very similar to yeast breads although much more easily digested as they contain no yeast germs to generate fermentation.

The same essentials need to be observed in the making of unfermented dough breads as in the preparation of batter breads. The material of which it is to be composed should be of the best possible quality, and the colder it is the lighter will be the bread since the lightness of all aerated breads depend not only on the amount of air which can be gotten into ~~xx~~ them, but the expansiveness of this air, and the colder the air the greater will be the expansiveness, and the colder the material used the more it will cool the air confined in it. The material should be measured and the oven in readiness before beginning to put the material together. Air is incorporated into dough breads by kneading, chopping, and pounding. [Demonstrate these processes] This process should be continuous after it is once begun until the bread is well aerated when it should be gotten into the oven with all possible dispatch. Much bread of this sort is spoiled by the slowness with which it is shaped after it is well aerated. If for any reason the dough must stand before it can be baked it should be placed directly on ice. This will cause the air within th dough to become of a lower temperature than that of the surrounding atmosphere and hence less likely to escape from the dough. The same plan should

be pursued with batter breads if necessary to keep them any time before baking.

As with the batter breads, so with dough breads; they are best baked in some small form as rolls, sticks, cubes, or biscuits. The best utensil for baking such breads is a perforated sheet or tin which will admit of the cirhulation of the heated air to all sides of the bread at the same time so that a crust will be formed over the whole surface befo before the air has had a chance to escape. For the same reason the little rolls or biscuits should be placed so far apart on the pan that there will be no possibility of their touching each other. If one has neither the perforated sheet nor the tin, the upper oven grate well scoured is preferable to an ordinary tin.

[Show process of making the breads, sticks, rolls, crisps, only.]

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FERMENTED BREAD.

There are few articles of food so universally used and at the same time so frequently falling below the perfect standard as bread. This is not due to the fact that bread is a difficult article to make, or that there is any mystery connected with its manufacture, nor is there any luck and chance involved. We frequently hear housekeepers say, "I had such poor luck with my bread today," or "Just now I happen to have excellent bread," as though bread was a food which might or might not be good depending upon chance. Whether bread be good or poor does not at all depend upon chance, but it does depend upon a thorough knowledge of the scientific principles involved in the various operations of bread-making, and careful attention to all details. With a knowledge of the nature and properties of the various ingredients to be used in the bread and of the processes which they must undergo, added to carefulness and thoroughness of management on the part of the cook, there need never be a failure in bread making; or, to make the matter still more plain,--bread is generally made of wheat flour and liquid made light by the intervention of some gas between the atoms of flour to keep them separated. Now we understand that we use wheat flour in preference to that of other grains, because, besides the fact that it contains the most correct proportion of food elements of any of the grains, its gluten is different in character and greater in quantity than that found in most other grains and is better adapted to the preparation of light bread.

It being the gluten in the flour, which, because of is elastic properties when made into dough permits of its being stretched and distended in the process of rising to several times its first bulk, thus making a light and porous mass. Different flours possess different properties, and the gluten of flours differ in quality and strength depending upon the wheat from which it is made and the process by which it is milled. Hence our knowledge of bread making must include a knowledge of flour, and the more complete the knowledge, the better equipped are we to make use of flour in the making of bread.

In the making of light bread with yeast, we must fully understand the chemsitry of yeast, and the process of fermentation, then by selecting good flour, good yeast, good liquid, properly combining them and giving them good care, there will be no need of failure. This makes a very simple recipe for the preparation of bread. Seemingly a very plain and simple operation, and so it really is when we understand these five things thoroughly. There are scientific principles underlying everything in cookery and bread is no exception.

The next thing to be considered is the proper combination of the materials when at last we have good flour, good liquid and good yeast. Under this head we must consider the quntity of material, the measurements of it, and the method of putting it together, and what to put it together in. The quantity of flour needed for a given amount of bread will vary somewhat with the kind

and the quality of the flour. Different kinds of flour and different brands of the same kind having different absorptive properties, so that it is impossible to lay down a rule which shall be, like the law of the Medes and the Persians, without any variation, but approximately, one scant measure of liquid, including the yeast, will require three heaping measures of flour. Take this as an approximate rule for white flour. Bread made from entire wheat flour will require from one-half to one cupful less than that made of white flour. A quart of liquid is generally considered sufficient for three loaves. Of the yeast 1/2 to 2/3 cup of liquid or 1/4 to 1/2 cakes of compressed dissolved in a half cup of warm water is sufficient yeast for three loaves. It is a very common mistake to use too much yeast. It lessens the time required but uses more of the nutrient principles of the grain. Bread which it is desired to have slow in rising as when set over night, should have less yeast. Neither sugar, salt, butter, or other free fat, are essential in bread, though frequently used. If sugar is used one even tablespoonful to three pints of flour, and never more than 1/2 teaspoonful of salt to the same quantity. The tenderness of texture, supposed to be due to use of butter may be just as well secured by using unskimmed milk as the liquid, with thorough kneading of the loaves. The materials usedin bread should be accurately measured. The flour should be sifted before measuring and the necessary amount for the entire process of the bread making measured out. A great deal of bread is spoiled by guess work in the use of flour. The liquid and yeast is perhaps proportional

rightly but the flour is sifted into a pan and used in a sort of hap-hazard manner, sometimes less and sometimes more, for the same amount of liquid. As I have previously remarked, there will of necessity be some variation necessary with different liquids, different quality and different kinds of flour, but with the same kind of liquid and flour from the same barrel, the housekeeper should use exactly the same amount of flour to make three loaves of bread today that she did last week and no more. (Supposing of course that she used the correct proportions last week.) Measurement of the flour and properly proportioning it to the other ingredients has much to do with success in bread making. The method of putting the materials together are numerous and nearly all good, if thoroughly carried out, but the best plan seems to me to be, first mingle the yeast with the liquid and then add flour beating it very thoroughly, as the purpose is to diffuse the yeast well throughout so that each little atom of flour shall have its attendant cell of yeast. Whether enough liquid and flour be at once used to make a dough, or whether all the liquids and but a portion of the flour be used making a thin batter only to which after it is risen more of the flour be added, and the whole made into a dough may be left to the taste and convenience of the user, good bread can be made both ways; but from my own observation I am convinced that the lightest bread and that the finest texture is produced by preparing a batter first and allowing it to rise, which it will do more quickly in batter, before making it into dough, and after

kneading it well in a dough, allowing it to rise once or twice more before abking. But, as before remarked, good wholesome bread can be produced by both methods. The objects to be attained in combining the materials is to thoroughly and completely mingle the ingredients. If they are in a thin mixture this can be done by vigorous beating but when the material is made into a dough it must be done by kneading, which should at whatever stage of the bread it is done, be thorough. Thorough kneading does not necessarily mean a great expenditure of strength, much more is accomplished by lightness and deftness of touch than by force. Much bread is spoiled in kneading by the addition of large quantities of flour to keep it from sticking to the board. This is not a necessity. If bread is properly kneaded it will not atick to the board. The secret of good kneading is to keep the dough in constant motion, to knead with the palms of the hands, using the fingers to turn the bread. If kept in constand motion a sort of crust or film will form over the surface which should not be broken by the fingers. If the bread is carelessly kneaded and with frwquent stoppings it will stick to the board, sufficiently kneaded.

The utensils best for use in bread making is earthen ware, since being a poor conductor it protects the bread better than tin or wood.

The time to start the bread must be governed also by the convenience of the maker. It is possible by surrounding the bread with proper conditions to start it at night and have it ready to

finsih in the morning, since by using but little yeast and keeping it rather cool, the process of fermentation can be made to proceed very slowly.

The next point for consideration is the care of the bread throughout the entire process. The yeast is the principal object of care. In order that it may grown and thrive properly the bread should be started at a lukewarm temperature and kept at an equable temperature throughout. An equable temperature is imperative if success is to be gained. It may be even quite a low temperature but it must be an even one. A variable temperature tempts disaster. The best and safest temperatures are between 70 and 75 degrees. A higher temperature causes the yeast plant to propagate so rapidly that unless it is very closely watched it is liable to over ferment and sour, or if it does not sour to ferment to that point that the bread will be harsh and tasteless from the loss of so much nutriment. It is a delicate point in the care of bread to tell just when it is sufficently fermented, since one especial thing always to be avoided is over fermentation. A thin batter is sufficiently fermented when it appears foamy and effervescent. throughout like yeast. A thick batterwhen it has doubled its first bulk and becomes cracked over the top, and dough is sufficiently risen when it has doubled its first bulk, and feels light and aerated when lifted in the dish and weighed in the hand When the dough is sufficiently light and ready for baking, care must be taken that the oven is of exactly the right temperature to destroy the yeast plant and fix the cells which have been made

in the loaf by the carbonic acid gas during the process of fermentation, before the gas escapes and the cell walls collapse. To accomplish this the temperature will need to be at least 400 degrees. The fire should be so arranged that the heat will increase for the first fifteen minutes, remain steady for the next twenty, and then be-in to decrease.

(Test of oven, brown flour in five minutes.)

The time required will be from 3/4 of an hour to 2 hours according to the kind of bread and the size of loaves,--better ten minutes too long than not long enough. Bread is lighter baked in small and separate loaves.

When done remove it from the tin and place on one side so that the air may be circulated on all sides of it at once. Now if good care is not taken to keep the bread at an even temperature, allowing it , as many housekeepers do, to stand in a place where one hour it will be hot and the next cold, failure will be almost certain. If care is not given to properly combine the ingredients and to properly knead the dough and thus thoroughly diffuse the yeast, there will be large holes and cavities in the loaf where too much yeast collected at one corner and caused a sort of explosion and shattering of material. If too much flour is added during the kneading or otherwise, the loaf, even if light, will be dry and stiff, because more flour was included than the liquid could properly hydrate. If care is not given to watch the fermentive process and the bread becomes too light, it will be tasteless and dry

if not soured. Lightness is not the only requisite of bread, and should be secured with as little deterioration of flour as possible. If care is not taken to have the loaf of proper temperature the fermentation will not cease until the bread has soured and the cells will be imperfectly fixed or entirely collapsed, too little moisture will have evaportaed and the result willbe a soft, wet, pasty loaf. If the heat is too great the bread will be baked before it has perfectly risen, or a thick hard burned crust will cover the top, forming a non-conducting covering which will prevent the heat from penetrating the interior, and the loaf will have an overdonetexture and be raw and doughy within.

If, on the other hand, good care is given the result will be a perfect loaf. There are several tests for good bread. Crumble pressure of loaf.

Whole wheat and graham breads are prepared according to the same general principles as whites but owing to the fact that they contain more gluten than white flour, and gluten is more readily decomposible than starch, they are more difficult to make than white flour bread, since they sour more readily. Less yeast and slowerrising is in general needed. The novice in bread making should always begin with white flour bread as it will endure more neglect than will bread made of graham or whole wheat. When one has learned perfectly to control the conditions necessary for good bread making with white flour it will be easy to make good graham and whole wheat flour bread.

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Our subject this afternoon is unfermented bread, while bread made light by fermentation may be considered by many housekeepers the most convenient for general use it is not the most nutritious, form of bread, since in the fermentative process the nutritive elements of the bread material are destroyed to a greater or less degree, depending upon the extent of the fermentation, neither is it, taking the world over the most universally used form of bread. In Northern Europe and Asia except in the families of the ~~nopu~~lity fermented bread is almost unknown, and in so little esteem is it held that an English sailor putting up in the Northern Europe port a few years ago was hardly able to persuade the bakers of the city to make a supply of raised bread for him for use on his own vessel for fear it would after being made be such a "drug on the market" as the saying is that it could not be disposed of, and would only consent to make it after a contract had been signed by the sailor to take the entire batch as soon as baked.

Unleavened cakes of rye and wheat flavored with annose seed about one fourth of an inch in thickness and as large around as a plate with a hole in the center or at one side like that of doughnuts is a co mmon form of bread in Norway and Sweden. I am told they are baked in considerable quantities and strung on lines till needed. The peasantry in nearly all European countries use unleavened bread for ordinary purposes. The Mexicans peasantry use an unfermented bread made of corn first soaked in lime water until softened then ground and reground into a plastic dough, shaped with the hands into thin ~~on a metal, afterwards mixed to a dough with water, which after being rolled thin~~

cakes and baked on a clay dish over a charcoal fire

and ~~shaped with the hands is baked~~. Unquestionably good light unfermented bread is the most wholesome of all breads. Generally when unfermented breads are spoken of the term is supposed to include breads made light by the use of chemicals but I wish to exclude all bread made light with such chemicals as amonia, soda, cream of tartar and baking powder, get when measuring with a teaspoon, but their ingredients are subject to the same deteriorating influences as are soda and cream of tartar when used in mixed and unscrupulous manufacturers do not hesitate to adulterate baking powders with all manner of harmful substances. Alum is a frequent adulterant. A eastern scientific journal compiled a list of baking powders which from official reports were known to contain alum or ammonia which numbered ninety five, and from the names given I judge it to include about all known baking powders. The gov. Chemist a few years since analized a great number of baking powders and found every one adulterated at that time . The use of alum in bread is exceedingly harmful to health. But even if the chemicals used in baking powder were not adulterated the use of such articles in bread would still be unwholesome, they are inorganic substances which must be eliminated from the system without any use being made of them. The notion is prevalent that during the baking process in some occult way the chemicals are made to disappear from the bread as the alcohol and carbonic acid gas does from yeast bread, but this is wholly a mistake . The chemicals neutralize each other but do not destroy each other. In combining they form a neutral salt which remains

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LIGHT, TOOTHSOME BREAD WITHOUT YEAST, BAKING POWDER, OR FLOUR.

A Short Cut from the Wheat Field to the Dinner Table, the Miller and the Baker Eliminated.

From time immemorial bread has been rightfully regarded as the staff of life. The chief food of the Roman soldiers was wheaten cakes. The old Israelites made bread, both leavened and unleavened, from wheat ground in stone mills exactly like those still in use in oriental lands. The accompanying cut is a half-tone reproduction of an ancient mill recently brought from Cairo by an American gentleman who recently visited Egypt. The Mexicans grind flour on a peculiarly shaped mill called a metate. (See accompanying cut). North American Indians made flour by pounding corn with a pestle in a hollow cut in a log or the end of a stump.

The modern mill is an enormous and exceedingly complicated machine in which wheat is crushed to a fine powder and separated into a great variety of products, differing in color, flavor, and nutritive value, but none superior to the meal prepared from the whole grain by the rude mills used by our ancestors and still employed by the primitive people of uncivilized lands.

The modern mill unquestionably would be responsible for the increasing prevalence of rickets, a grave disease of the bones, and the premature decay of the teeth so universal among civilized people. The use of fine white flour deprives

the body of the elements which are essential for the building of solid bones, strong nerves, active brain, and enduring muscles. Attempts have been made to remedy this defect by the introduction of corrected wheat, oatmeal, and various so-called breakfast foods, but these pasty messes which have appeared in such multiplicity and variety as to have ushered in a veritable mush-eater have in no way remedied the evil, as the eating of these half cooked and hence crude and indigestible farinaceous stuffs has developed a new form of gastric misery known as amylaceous dyspepsia, and must accordingly be respensible for many cases of diabetes, according to the recent researches of Professor Pavy, the English physiologist.

Mush is no substitute for bread, and half cooked, coarsely ground wheat, corn, or oats, while it may be good food for cows, horses, and pigs, is not wholesome food for human beings and its use cannot be considered in any sense an antidote for the evil results arising from the use of the superfine products of our modern mills.

Notwithstanding the fact that flour is one of and perhaps the most ancient of all artificially prepared food stuffs, and the immense amount of time, ingenuity, human energy, and capital which has been devoted to the building, manufacture, and construction of flour mills, recent discoveries compel the recognition of the fact that the flour mill is useless and flour a thing to be left behind in the march of human progress, along with numerous other relics of

bygone ages.

Surprising as the fact may be, it is nevertheless true that within the last ten years discoveries and inventions have been made which render it possible to convert wheat into biscuits which are lighter than the airiest products of the baker's art and far more toothsome than any bread can be which is raised with yeast fungus with its disgusting properties (?) such as alcohol, carbonic acid gas, etc., or those unwholesome compounds of tartaric acid, sodium, ammonia, phosphoric acid, and other chemical stuffs called baking powders.

The process is unique, but simple. The accompanying cut gives a glimpse of one stage in the process. Briefly stated, the method is as follows: The wheat is first carefully sorted by means of a machine which picks out the plumpest kernels, turning aside straw, chaff, cockle, undersized, shrivelled, and broken grains to be used as food for stock. Various processes of cleansing are then adopted, including brushing, scouring, and finally washing. The wheat is then thoroughly sterilized and cooked, which is quite essential, for the dust which clings to wheat is very largely made up of germs of various sorts which is gathered by the wheat-heads as they sway back and forth in the field and by the wheat where it lies for months in stores and barrels in elevators.

The kernels are next put through rollers by which they are subjected to enormous pressure and flattened out into thin, translucent, almost transparent flakes the thickness of which is

not greater than ordinary writing paper. The amount of pressure required may be judged by the fact that the axles on which the rollers revolve, measuring from four to six inches in diameter, not infrequently break under the pressure to which they are subjected. Each grain becomes a single flake, more delicate and fragile than the tiniest leaf that flutters in the air.

The next and final step is the toasting or roasting which is effected by exposing the flakes for a sufficient time to a blast of superheated air. When finished, each flake is done to a delicate brown color, crisp, nutty in flavor, and melts instantly when brought in contact with fluids of any sort. Each single grain thus becomes a little cake or loaf, so light that it may float away on a breath of air, yet containing nothing but the original wheat, and of this it contains every particle. Even the bran is all there, yet broken up into such minute particles that it can scarcely be seen without the aid of a good magnifying glass. When a handful of these flakes are dropped into a glassful of water, they do not become a pasty mass as does a spoonful of flour, but each feathery flake floats about by itself, perfectly retaining its form, and even when several flakes are rubbed together between the thumb and finger, it is impossible to make a pasty mass. Bread thus made cannot be converted into doughy balls in the stomach like ordinary baker's bread, the central portion of which may be very easily converted into a veritable baseball by a little judicial manipulation.

CAKES FROM FLAKES.

By a slight change in the process at a certain stage, the flakes may be formed into convenient shapes or biscuits which for lightness and crispness are unapproached by any other form of bread.

Granose flakes and granose cakes are the most unique bread stuffs which have appeared in modern times, and the inventions and discoveries which rendered their production possible are working a veritable revolution in the dietary of civilized people. The success of these products has been so great that numerous imitators and imitations have appeared. Just at the present time the market is filled with half-cooked or overcooked, flavored and scented flakes of various sorts, many of which emanate, or claim to emanate, from Battle Creek or vicinity. The promotors of these nefarious enterprises are evidently banking upon the easy credulity of the general public, calculating that the average man is too busy to inquire about the genuineness or the reliability of the things which he puts into his stomach, being content to know that it is palatable.

The Sanitas Nut Food Company are the sole owners of the patented inventions under which all thoroughly cooked cereal foods are manufactured. Their patents control not only the process of manufacture but the product itself; that is, a thoroughly cooked cereal flake.

For methods of preparing and using Granose Flakes or Toasted Wheat Flakes, see page ....., of this number.

Half-page Illustration.

DAINTY DISHES PREPARED FROM GRANOSE FLAKES

As Served to Patients at the

Battle Creek Sanitarium.

(Recipes)

MEAT ROASTS, STEWS, AND OTHER MEAT DISHES, DELICATE ENOUGH TO PLEASE A GORMAND, BUT PREPARED WITHOUT FLESH.

Our meat substitutes, especially protose and nuttolene, carefully prepared according to the following recipes, will be found a complete substitute for flesh foods of all sorts.

(Recipes)

(Select one of the most taking dishes, say granose flakes or toasted wheat flakes, for an ad).

(Advertisement)

TOASTED WHEAT FLAKES.

The Only Original Battle Creek Flakes.

All Others are Imitations.

Many of these contain cane sugar, glucose, cheap commercial malt, etc. Toasted Wheat Flakes is nothing but wheat with a delicate flavor of malt honey. The undersigned are the sole owners of the process and product patent on the manufacture of thoroughly cooked cereal flakes issued by the United States Government. All other manufacturers of similar products are guilty of infringement. Suits for the protection of our rights have already been begun and will be vigorously prosecuted.

Ask your dealer for original and genuine Battle Creek flakes which are manufactured only by us.

SANITAS NUT FOOD CO., LTD.

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Lecture No. 4.

Unfermented Breads made into stiff Dough.

In baking breads of this kind it is necessary to make them in some small form like buscuit or crackers, or they should be rolled out very thin and baked upon something that will allow the hot air to touch all sides at once. There is nothing better for this purpose than a perforated sheet. It may be either tin or iron.

The method of incorporating the air into this kind of bread is by kneading or pounding. In the preparation of this kind of bread the same as for the batter bread, the material should be cold, the colder the better. The material and oven should be in readiness and the oven at about the same temperature. In the process of making we wish to incorporate and retain the air the same as in making the batter breads.

Recipes.

Beaten buscuit.---The air is incorporated by pounding or beating. Take one quart of whole wheat flour and put it into a large bowl or other vessel so that you can make a hole in the centre. Then pile up the flour around the sides leaving a hole in the centre. Then stir into this quart of flour one cup full of sweet cream about twelve hours old. It should be stirred in in small quantities at a time, say one tablespoonful. Then mix this to a dough with your spoon before you put in any more; Then stir in a little more, and so on. As the flour has been used up at the bottom bring it down at the sides. The object in stirring in the cream in small quantities at a time is so that the dough will be in layers something like puff paste. After the cream is all stirred in, place the dough on your kneading board on a small quantity of flour. Then with a mallet or hammer or anything that is

suitable for pounding, pound it out flat; then fold it over and pound it around the edges so as to retain the air before it escapes. Then pound out flat again. Continue this process, adding a little flour each time until it is all used up. When the dough has been pounded sufficiently it will snap when a piece is pulled off. It is impossible to give a recipe that will be invariable for every brand of flour. You must use your own judgements as to when you have used flour enough. These recipes are for the brands of flour I have been accustomed to.

Having pounded the dough as much as necessary, take it in the hands and form it into buscuits about two inches in diameter. Then take it in one hand and with the thumb of the other hand make an indenture. The object of this is so that it will be of the same thickness throughout and will bake evenly. They should be baked on a perforated iron so far apart that they will not touch each other. It is very easy for a person to make these buscuits from the written recipe without ever having been shown how.

Cream rolls.--Take one and one-half pints of whole wheat flour; one cup of milk or cream, or cold water may be used, especially with graham flour. They are to be made light by kneading. They will be more moist made with milk, more crisp made with water, and more tender made with cream. The liquid may be mixed with the flour in the same way as for beaten buscuit. After the dough is thoroughly kneaded, divide it in parts and with the hands roll it into long thin rolls, nearly as large as you desire to have them when baked, and cut them into the desired length. If made with milk, a medium sized roll will do very nicely; if made with cream, you may have them quite thick. If made with water form only about the size of ones finger. The dough should be so thoroughly kneaded and the flour so thoroughly mixed with the liquid that the rolls will be perfectly smoothe on the outside.

They should be baked on the perforated irons and should not touch each other.

Neither the beaten buscuit nor the rolls should stand a moment after they are made before baking unless they are put on ice. The should be beaten or kneaded for at least half an hour. As to the kind of flour to be used, my experience is that the whole wheat flour is best for the buscuit and the graham flour is best for the rolls. A very good bread can be made with water from graham flour. This is because it is more granular.

Another kind of unfermented bread made into a dough is graham flakes or crisps. Take one cup of ice cold water and stir into it graham flour enough to make a thick dough. Some like the addition of a spoonful of sugar. The process in making the crisps is similar to that of the puffs. The flour should be put in a little at a time, and the material should be very cold. After it is kneaded roll it out very thin, as thin as brown paper or a knife blade. It may be cut into small sheets or baked in large sheets. Bake until brown on both sides.

Almostbeveryone speaks of the great amount of labor that is put into the beaten buscuit, and think it is more than they can do. I think the trouble lies in their putting too much syrength into the beating. It is not necessary to put a great deal of force into the beating, only that it should be continuous. I must say, however, that in my experience very large quantities of bread made up in this way are difficult to manage. If a large quantity is made it is better to di-it and beat a portion of it at a time. These forms of bread, especially the buscuit, are most excellent for lunches, picnics, and traveling. I know of no other form of bread that will keep so long. I have kept it from a week to ten days and it seemed as fresh as when baked.

Unfermented breads of this character made either from dough or

batter must rank first in the list of wholesome breads. Perhaps it is more convenient to make breads light by fermentation, but so far as wholesomeness is concerned they are not equal to the unfermented breads. Fermentation is a decomposing process and by it some parts of the material are destroyed. Foods that contain nitroginous elements decompose readily when subjected to warmth and moisture. The nitrogen is acted upon by the oxygen of the air. Pure starch, sugar, or fat may be exposed to the air for a long time without decomposing. But these carbonaceous substances if placed where they will come in contact with the nitroginous foods will readily decay. If we place a bit of unfermented dough in contact with a piece that is fermenting, it will very soon begin to ferment. There are three stages of fermentation, the alcoholic, ascetic or acid, and the putrifactive fermentation. The first will develop into the second and the second into the third form if permitted to do so. During the alcoholic stage the sugar in the fermenting substance becomes changed into carbonis acid gas and alcohol, and this gas puffs up the dough in the same way that the gas produced by the chemicals does. If the dough is baked while the gas is being given off, we will have a light porous loaf, but if we allow the fermentation to continue until the ascetic stage is reached, there will be no carbonic acid gas to make the dough light and the alcohol will be sour like vinegar, and the result will be heavy sour bread. If fermentation is made use of to raise bread we must be very careful that it does not go beyond the alcoholic stage. Fermentation may be carried so far that it will destroy much of the sweetness of the bread before it reaches the ascetic stage. Fermentation in vegetable matter is always accompanied by the growth of living organisms called fungi, the development of which is regarded as the exciting cause of fermentation. The spores of these fungi are present in the air at all times. It is a well known fact that if we stir up some flour and water

and put it in a warm place it will soon begin to ferment. This is because these germs get into it. Housekeepers make use of this fact to make salt rising bread. This process of fermentation, however, is subject to many inconveniences, and most housekeepers prefer some more active agent as yeast.

In order to develop properly, yeast must have warmth, moisture, and food just like other plants. If we supply it with these conditions it begins to multiply very rapidly. It is estimated that in one cubic inch of pressed yeast there are 1,152,000,000 of these little germs. The best food for the yeast plant is sugar, and if placed in any substance containing sugar, it will find it of its own accord. In the process of feeding, the yeast excites fermentation. Besides food it requires warmth and moisture. It will not grow below a temperature of 32 degrees, grows slowly at 40 degrees, and will grow in any temperature from that up to 90 degrees. It will not stand boiling water or freezing cold. The best temperature is between 70 and 80. 75 is the golden mean. The fact that its growth can be checked at the boiling temperature permits a person to stop its growth by putting the bread into the oven and baking it. It also permits our setting the bread and keeping it at a low temperature so that the growth will be very slow. The very best kind of yeast, and that which is most sure when fresh to be reliable, is the compressed yeast. It is also the most convenient. It is possible to make home made yeast that is just as reliable but not so convenient. The dry yeast cakes on the market make inferior bread to that made from the compressed yeast or from home made yeast. Some think that Yeast Foam is fully as good as the compressed yeast.

Of the home made yeast there are almost as many kinds as there are different cooks in the world, and their comparitive merits are about the same. They are all made on the same principle, and that is the

introduction of a small quantity of fresh yeast into a batter of starch and water to which may be added other substances to promote the growth of the yeast plant. Salt and hops are the antiseptic agents used to preserve the yeast. If we put fresh yeast into the batter and then supply warmth and moisture it will soon grow and fill the whole mass. Then if we put it into an airtight vessel and put it in a temperature of 30 degrees it can be kept in an aquiescent state. The starch of the potato is thought to be more conducive to the growth of the yeast plant than any other kind of starch, hence it is generally used for this purpose. For making and keeping yeast, earthen or glassware are the best utensils. If your yeast is stored away, when you wish to use from it, it is best always to go to where the yeast is and not bring it into a warm room or near the stove where it may become active.

Fresh yeast is always the best. Stale yeast, although it may make the bread light, is not the best to use. Home made yeast when good is light and foamy in character, and has a pungent odor similar to ammonia and a sharp biting taste.

Compressed yeast, if it is good, will break off dry and crumbly; if it is poor it will be stringy and moist. If there is any question about the yeast it is always best to test it by mixing up a small quantity, and if it begins to rise in fifteen or twenty minutes it is good, if not it is not good. If we will always remember the conditions under which yeast grows, we will have very little difficulty in the use of it.

613.2

Our subject this afternoon is unfermented bread. While bread made light by fermentation may be considered by many housekeepers the most convenient for general use it is not the most nutritious form of bread, since in the fermentative process the nutritive elements of the bread material are destroyed to a greater or less degree, depending upon the extent of the fermentation, neither is it, taking the world over the most universally used form of bread. In Northern

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Europe and Asia except in the families of the royalty and very wealthy fermented bread is almost unknown, and in so little esteem is it held that an English sailor putting up in a ~~Dundee~~ northern English port a few years ago was hardly able to persuade the bakers of the city to make a supply of raised bread for him for use on his own vessel for fear it would after being made be such a drug on the market as the saying is that it could not be disposed of, and would only consent to make it after a contract had been signed by the sailor to take the entire batch as soon as baked.

3

unleavened cakes ~~and~~ of rye and wheat flavored with anise seed about one fourth of an inch in thickness and as large around as a plate, with a hole in the center or at one side ~~a~~ ~~common~~ like ~~the~~ a doughnut form of bread in Norway and Sweden, I am told they are baked in considerable quantities and strung on lines till needed. The peasantry in nearly all European countries use leavened bread for ordinary purposes. The Mexicans peasantry use an unfermented bread made of corn first soaked in lime water until softened then ground in a metaté afterwards mixed to a dough with water, which after being rolled thin and shaped with the hands is baked. Unquestionably good light unfermented bread is the most wholesome of all breads. Generally

¶ when unfermented breads are
spoken of the term is supposed
to include breads made light
by the use of chemicals but
I wish to exclude all bread
made light with such chemi-
cals as amonia, soda,
cream of tartar & baking powder

5 get when measuring with a teaspoon, but their ingredients are subject to the same deteriorating influences as are soda & cream of tartar when used unmixed and unscrupulous manufacturers do not hesitate to adulterate baking powders with all manner of harmful substances. Alum is a frequent adulterant. A eastern scientific journal compiled a list of baking powders which from official reports were known to contain alum or ammonia, which numbered ninety five, and from the names given I judge it to include about all known baking powders, The gov-

chemist a few years since analyzed a great number of baking powders and found every one adulterated at that time. The use of alum in bread is exceedingly harmful to health.

But even if the chemicals used in baking powder were not adulterated the use of such articles in bread would still be unwholesome, they are inorganic substances which ~~cannot be used by the system~~ must be eliminated from the system without any use being made of them.

The notion is prevalent that during the baking process in some occult way

the chemicals are made to disappear from the bread as the alcohol and carbonic acid gas does from yeast bread, but this is wholly a mistake The chemical neutralize each other but do not destroy each other. In combining form a neutral salt which remains in the bread, and liberate a gas which in rising puffs up the loaf. The salt formed by the union of cream of tartar and soda when used in the bread unmixed or in the form of baking powder, is one identical with the Rochelle salts of medicine and if we should analyze the bread and weigh the

& the salts we should find it almost exactly the same quantity as that of the baking powder we put into the bread, If in a batch of biscuits we use 2 teaspoonfuls of baking powder we would have in these same biscuits when baked 165 grains of crystallized Rochelle Salts or 45 grains more than there would be in a Seidelitz powder,

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There are two forms in which light unfermented bread may be made with air, those ~~made~~ baked in the form of a batter, and those made into a dough before baking. We will today speak only of batter breads,

All materials for the bread should be of the very best in quality, poor flour will not make a good unfermented bread any more than it will a good raised loaf,

All breads whether fermented or unfermented are lightest

when baked in a small form particularly is this so with regard to unfermented breads for this reason batter breads are best baked in small dishes, or cups, such baking cups are obtainable in various shapes, ordinarily the most shallow are preferable and result in a lighter bread.

The heat of the oven ~~while it will hardly need to be as great as~~ ~~for~~ will need to vary with the kind of bread and the materials from which it is made but it will need to be sufficient to form a slight crust over the entire surface of the bread very

Soon after it is placed in the oven before ~~the heat has penetrated to the interior of the bread thus causing the~~ air within ~~it to~~ the bread has escaped. For this reason the cups in which the bread is to be baked need to be heated that the baking process will the more quickly begin after the bread is introduced into the oven. In short every device must be resorted to to keep the air from escaping before it has made the bread light by expanding within it.

In making the bread it is important that all materials be in readiness before beginning the work of putting the bread together, as if we stop to do something else after beginning the work

we lose all we have gained for while we leave the bread the air will escape. To get the air into the bread, we must beat the batter not stir it, this beating must also be continuous and not interspersed with any stirring other than to scrape the dough from the sides of the dish,

The material to be used depends somewhat upon the convenience of the user, good whole wheat flour or graham flour from the standpoint of health is to be recommended as best, with graham flour milk or water may be used with whole wheat flour the best results will be obtained with whole milk, that is milk containing its natural proportion of cream or skim milk with one third cream

For the novice it will be found easiest to begin making these breads by using in the bread the white of an egg to help catch and keep air. The white of an egg is viscous and glue like and when beaten it catches and retains several times its bulk of air, and of course incorporates this air into whatever it is introduced thus making it also light. After one has become thoroughly accustomed to making uninfermented breads the egg may be dispensed with, without failure if desired.

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14 The lightness of bread is not only dependent upon the amount of air contained with in the loaf but the temperature of that air, as the colder the air the greater will be its expansion for this reason, the material used is preferable as cold as obtainable,

We have had ~~most~~ excellent success with breads prepared and left on the ice for an hour or two or even all night before baking — by which the entire mixture became ice cold,

The heat of the oven should be greater for breads made without egg than for those prepared with it. The same is true of the irons. If with the eggs the oven or irons

are too hot the result is apt to be a large hole in the middle If oven is too cold and the air escapes before a crust is formed the result will be a solid heavy bread. If just right ——

A little experience will make one familiar with all the conditions. In fact it is experience that must be gained after all that can be said both regarding fermented and unfermented breads before success is assured.

613.21

EGG FOR THE SICK.

When it is desirable to obtain a large amount of nutriment in the smallest bulk an egg often serves an admirable purpose, as a food for the sick. The two parts of which it is composed, the white and the yolk are very different in their composition. The white of the egg is composed of albumen and water and a small percentage of mineral elements. The yolk of the egg contains albumen a considerable fatty material, in fact all there is in the egg about 30 of the yolk water, and some mineral matter also. Eggs vary in quality according to the food upon which the fowls were fed. Ordinary barn yard fowl are scavengers as every one knows and the eggs of such to a certain extent must pertain in some degree to the impurity of their diet. If people are to use eggs they should feed their fowls on a wholesome diet and in sufficient quantity so that they will have no need of seeking a diet of refuse. An egg for cooking purposes needs to be at least a day old, to be at its best, as the white does not become thick and can not be beaten stiff until it is at least 10 hours old. From that time on as long as the egg can be kept perfectly fresh it is suitable for use. An egg which has become at all stale is questionable food and the use of stale eggs alone or in combination with other material has often led to serious consequences. Then are some housekeepers who seem to think that if an egg is too stale to be cooked by itself it may be used for puddings in which its taste may be disguised by sugar and spices. But it is a fixed

principle of scientific diet that unwholesome material can not be converted into a wholesome article by the addition of something be change the taste.

An egg changes in colume by keeping the contents of a freshly laid egg nearly fills the shell but as the shells are porous on exposure to the air the water which forms a considerable portion of the egg evaporates and the egg grows lighter while air rushes in to fill the space made vacant by the avaporation of the water. As the space inside the shell becomes filled with air the oxygen begins to act upon the nitrogenous material of which the egg is composed the same as it does upon nitrogenous material under other circumstances and causes it to decompose and the egg soon spoils. The fact of the evaporation of water also explains why a fresh egg is heavy and will sink in water, and why a stale egg is lighter, has a rattling or gurgling sound and floats in water, which is the test generally given to determine the freshness of an egg.

An egg can be kept fresh for some length of time by coating it with some substances which will effectually seal up the pores of the shell thus preventing the water from evaporating and the air from entering.

Some people attempt to keep eggs by putting them in lime water or brine but the egg shell being porous the egg absorbs odors, readily and usually tastes of salt or lime when preserved in such material.

Eggs should be handled carefully as the yolk is only separated

from the white by a thin membrane which rough usage is liable to break and when the white and yolk of the egg becomes mingled the egg spoils quickly.

The white of an egg is composed almost wholly of albumen which being of a glutenous nature when beaten catches and holds a greater or less amount of air thus increasing to several times its original bulk. To be properly beaten the white of the egg should be stiff enough to hold up a dime or so firm that when the dish in which it is held is turned bottom upwards it will, if it falls out at all, it will fall all in one mass together. The yolk of the egg which although it contains some albumen contains so much fat that it can not be increased in bulk as can the white but it should if beaten at all be beaten until its natural yellow assumes a lighter hue and the whole forms a smooth emulsion.

The value of an egg as a food varies greatly according to the manner in which it is cooked. The great difference in the composition of the white and the yolk of an egg makes it considerably difficult to cook the two parts together in the shell and have each prepared in the most digestible form. Albumen of which the white is composed when heated to boiling temperature hardens into a dense solid if kept at this temperature, for a short time it will dry, shrink and become horny - so much so that the white of an egg makes a most perfect cement if smeared on the edges of broken articles and then heated to boiling temperature and kept so for a short time. It will be evident that albumen which when hardened has such cement like properties must with great difficulty be

dissolved by the gastric juice and this is true an egg cooked so its white is tough and densely hardened is very difficult of digestion. Albumen in all its forms is most easily digested when uncooked or simply coagulated. The yolk of the egg, if hardened at all, is on the other hand more readily digested when it is so thoroughly cooked as to be mealy. The white of an egg begins to coagulate at a temperature of 160° while 212° is boiling temperature. If an egg in the shell be placed in water of temperature of about 170° and kept for ten or twelve minutes the white will be of a jelly like consistency and the yolk will be soft. If however it be left in water of the same temperature from 20 minutes to 1-2 hour the yolks may become hardened.

A thermometer is needed for this purpose.

When eggs are boiled in the ordinary manner by immersing for three or five minutes in boiling water the white of the egg which is on the outside becomes at once tough and leathery while the heat is sufficient to properly coagulate the yolk.

Cooking a long time at a low temperature by which there will be a uniform diffusion of heat throughout is the only correct method by which eggs can be cooked in the shell so as to be readily digested. Long cooking at a low temperature is coming to be understood as the best method of cooking nearly all foods. It is universally acknowledged by all persons who have given the matter thought that rapid cooking at a high temperature is a detrement to almost all foods, because of the great waste of substance and flavor and in many instances as in the case of the egg it renders

the article much less digestible. The ordinary soft poached egg is much more digestible than the ordinary boiled one. An easier method of accomplishing the same end than poaching is to break a raw egg into an individual dish and cook in a steamer over boiling water the result is the same as a poached egg with out the drops of water so annoying and difficult to get rid of when eggs are poached. If an egg is to be poached some sort of a device like this is convenient. The water should be at a temperature below boiling and should not boil during the entire process. Break the egg into one of these places dipping the water over the top with a spoon until the white is well coagulated.

A good way to cook an egg for a sick person is to separate the white from the yolk, taking care not to break the membrane which surrounds the yolk, poach the yolk until mealy whip the white and cook also.

EGG NOG:- Beat the yolk of a freshly laid egg with a tablespoonful of sugar until light and creamy add to this I-2 cup of freash milk and stir in lightly the beaten white.

EGG NOG:- White of one egg to froth, I tablespoonful of sugar, yolk beat again , I tablespoonful water, I of milk and I one raspberry juice or water and one of lemon.

BAKED OMLET:- I quart of milk, 6 eggs, and a little salt.

EGGS.

Consist of proteid and fat.

Weight fifty grams.

Whites consist of proteid enclosed in cells which can broken up by beating. This increases the digestablity.

Egg albumen contains carbohydrate molecules.

Eggs contain one ounce white, one-half ounce yolk.

White is 86% water, 13% proteid, .25% fat, .06% salts.

Yolk 51% water, 16% proteid, 32% fat, 1% salts.

Roughly the yolk is one-half water, one-third fat, one-sixth proteid.

White is six-sevenths water, one-~~half~~ proteid.

The different elements are ~~not~~ mixed and combined in complex substances, which chemists are ~~trying~~ to unravel.

The fats in the yolk are ~~not~~ in a state of emulsion.

The yolk contains iron, one part in 10,000.

Forty-six eggs contain one grain of iron.

The body requires daily one-half grain of iron which equals ten milligrams.

The yolks of ~~three~~ eggs will supply the amount of iron required.

No food except milk, contains so much lime salts as eggs.

The nutritive value of eggs is the same as meat.

Water---	Egg 74,	Meat---	73.
Proteid--	" 15,	" ---	21.
Fat-----	" .10,	" ---	.05.
Ash-----	" .01,	" ---	.01.

Long boiling decomposes sulphides.

Digestablity of Eggs.

Experiments on man. Two soft boiled eggs, two and three-fourths, hours. Two raw eggs, twoand one-fourth hours. Two poached eggs, twoand one-half hours. Omlet, three hours. Hard boiled eggs finely chopped, one and one-fourth hours.

White of raw egg is not digestable inthe stomach.

Twenty eggs required for one day's proteids.

Food value of the yolk is more than three times that of the white.

Ten eggs equal a lb. of meat.

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THE FRUIT DIET IN URIC ACID DISEASE.

A fruit diet aids in the elimination of uric acid as well as in its destruction by increasing the alkalinity of the blood and so increasing the solubility of uric acid. This statement does not rest on purely theoretical grounds but may be demonstrated by anyone who would take the trouble to make the simple experiment of placing a subject for a few days upon a fruit diet and making careful comparative examinations of the urine. It has been demonstrated by Gautier and numerous other observers that the alkilinity of the blood is increased by organic acids, at least by tartaric, citric, malic acids. This statement does not apply, however, to oxalic acid, which is a toxic substance closely resembling uric acid in its effects upon the body and oxidized only to a very small degree, being in the most part eliminated as taken. Citric, malic and tartaric acids are found in the fruits in which they occur in the form of acid salts. When taken into the body, the acid, which is a carbohydrate, is set free from the potash and aiad with which it is combined and are burned like other carbonates, leaving the alkalies to become converted into alkaline carbonates by which the alkilinity of the blood is increased. Some years ago the writer made a study of the effects of fruit upon the elimination of uric acid in a number of medical students who were placed upon a diet consisting almost exclusively of fruit, the only addition being

a small amount of dried toast. The urea was of course diminished as the nitrogen intake was greatly reduced, but the output of uric acid was very considerably increased, on the average doubled, and in some cases more than doubled. A variety of fruit was given, chiefly bananas, prunes, apples, oranges and peaches. The source of the increased output of uric acid was doubtless the quantity of this waste element which had been stored up in the system. By the increased alkolinity of the blood, its ability to dislodge the uric acid from the tissues and transport it to the kidneys was increased and thus the output was increased. In a later experiment in which the fruit diet was continued for more than a week, it was observed that the increased output of uric acid continued only for a few days. After the first three or four days, the acidity of the urine decreased rapidly, and at the end of the week was nearly neutral.

(To be added to section on the general treatment of fevers just preceding Typhoid Fever).

CONVALESCENCE--When the temperature drops below 101 in typhoid and other contagious fevers, the packs or tubbings cease, and if there are no untoward symptoms little more is done except to feed and watch the patient. When the temperature drops to normal, the battle is considered as won and the patient is left preety much to himself as far as real treatment is concerned. This is an error. When the febrile action ceases, the havoc wrought by the profound toxemia to which the body has been exposed still remains, the patient is greatly wasted, the muscles are attenuated, possessing almost no strength or tone, the heart is weak, the blood is depreciated, the liver and kidneys are crippled by their long battle with toxins, the intestine is in a state of irritation, perhaps ulceration, the gastric secretion is diminished in quantity, is poor in quality, every organ of the body has been more or less damaged by the fierce flame of the fever. Not infrequently the central nervous system has suffered to such an extent that the patient's mind is temporarily weakened, and their is a necessity for general rebuilding of the entire body. This process is found very slow, requiring three to six months before the patient is prepared to return to his business. Not infrequently the recuperative powers of the patient fail before restoration is complete, leaving him in a permanently disabled state.

Great help may be given the patient during convalescence by judicious ap-

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(To be added to the paragraph on Hydrotherapy in the treatment of typhoid fever).

When constipation exists, it may be necessary for sometime to employ an enema daily, so as to encourage complete evacuation of the bowels. Not infrequently the patient's bowels will move regularly without complete evacuation, so that considerable material is left behind to undergo putrefaction, thus laying a great unnecessary burden upon the liver and kidneys to remove from the blood the enterotoxins absorbed. An ordinary enema of water at about 80 degrees may be employed. When the colon has been involved in the disease, there may be plastic contractions of the bowels which prevent proper evacuation. In such cases, the hot oil enema may be used with advantage. Linseed, or, better, nut oil may be used. The quantity should be one to two pints at a temperature of 104 degrees.

should be taken to avoid massage of the abdomen, though very gentle colon kneading will do no harm if necessary to combat constipation.

PHOTOTHERAPY--The photophore is an excellent means of relieving the abdominal pain and tenderness which frequently proceeds for a considerable time after a severe attack of typhoid fever. The duration of the application should be eight to fifteen minutes. It may be applied twice daily. The arc light is still more effective than the photophore when available. When the patient becomes strong enough to get upon his feet the general electric light bath may be used with great advantage, the duration being two or three minutes. It should be followed by the towel rub or half sheet rub, and, when the patient is strong enough, by the shower bath at a a temperature of 80 to 70 degrees.

MEDICAL GYMNASTICS--Manual SwedishMovements--(May's order). Breathing exercises are especially valuable as an aid to recovery in these cases. In taking the breathing exercises, a pillow should be placed under the loins so as to intensify the effect of the breathing movement upon the circulation of the viscera.

DIET--The only diet suitable for convalescents is the antitoxic regimen. This excludes all putrescible foodstuffs. The diet should consist of cereals of various sorts thoroughly cooked, especially toasted flake cereals and foods which are rich in iron, such as spinach puree, lentil puree, yogurt whey, buttermilk, the yolks of eggs and fresh and stewed fruits, fruit juices, are

appropriate foods. Banana puree, oranges, all the fresh fruits in season, are particularly good. Great care should be taken to avoid a too exclusive dietary of cooked foods. Something uncooked should be taken at each meal. Fresh apple juice, orange juice, banana purée and ripe fresh fruits in their season are particularly valuable. In the early stage of convalescence the food should be wholly fruit in character. As digestion improved an increasing proportion of solid foods may be given. The patient must be required to masticate very thoroughly. This will not only secure proper breaking up of the food masses in preparation for swallowing but will also secure thorough insalivation, and, as Pawlow has shown, will encourage the formation of appetite juice and so prepare the stomach for its task.

Grains

Examining this chart we find that the class of foods which rank higher both in the percentage of the nutritive elements they contain and the proper proportion of these elements are the grains. For this reason we shall give the grains the first place on the list of foods we shall take up in this series of lessons. The grains and articles made from them hold the most important place in the dietary of man and while it is true that many articles made from grains are universally used it is also true that the grains in their unground state, with the exception of an occasional dish of rice or oatmeal are very rarely found upon the average bill of fare in this country. ~~I believe~~ This lack of recognition of the grain foods is undoubtedly due to a lack of knowledge respecting their most excellent qualities. As I have before stated they approach more

nearly the perfect standard as regards amount of nutritive elements than any other foods, they are especially economical foods, costing on an average not over five cents a pound, and when they are properly cooked and eaten they are very palatable and easy of digestibility.

The great number of grain products to be found in market make it possible to employ a greater variety of this class of foods than almost any other, so that there need be no sameness to tire the appetite. ~~Just~~ ~~too I must to say that~~ and yet I ~~have some-times~~ imagine one ~~the~~ reason why the grains are not more commonly used is because only one or two varieties are ever purchased and these used exclusively until the family is tired of them. It is just as economical to buy a pound of ten different kinds as to buy ten pounds of one kind.

In ancient times the grains were largely used as a staple article of diet. The old German soldiers whose great

Compare with other foods

3 bodily strength excited the astonishment of the Romans lived chiefly on oatmeal porridge – The ancient Spartans also lived chiefly upon a grain diet. The most muscular men at the present time in all Europe the Scottish Highlanders, and the Russian live almost wholly upon a grain diet, the one upon oats ~~meal~~ the other upon rye.

Of all the grain foods wheat ranks first because of the more nearly correct proportion of its elements, though oats, barley and rye are ~~no less~~ exceedingly nutritious foods.

The cooking of grains is a very simple matter in itself but through lack of knowledge respecting the nature of the grain it is seldom properly done. The use of an improperly cooked grain is as detrimental to health as a properly cooked one is beneficial, a grain simply because it is a grain is by no means warranted to fulfil its true mission unless properly prepared. Double boiler – Can be cooked in other utensil

The grains belong to a class of foods which have lost nearly all their moisture

nutrition more palatable to taste

during their ripening, which necessitates a large amount being supplied them in their preparation for the table but the different processes of milling which they undergo as also the difference in the grains themselves necessitates ~~makes~~ different quantities of fluid for cooking ~~various~~ the different grains — give amounts You will notice ~~that~~ this point of similarity — most of the rolled grains — require — 3 parts water, The coarser grains require 4 — and the meals — although there are some exceptions to the rule. It is absolutely essential for the perfect cooking of grains that both the grain and the liquid be accurately measured with the same utensil or with two of equal size —

Guess work is exceedingly detrimental the plan of putting on the liquid and

adding enough grain to appear to be about right may occasionally produce a good result but it will not invariably do so, and the chances are that the good results will be so infrequent that a distaste for the food will be created.

Accuracy of measurement is one of the cardinal principles of good cookery and must be adhered to in all its details if success is desired.

The liquid to be used for the cooking of grains should in general be water, for some grains as farina, which are almost wholly composed of starch, and rice, milk or part milk is advantageous because it increases their nutritive value.

The liquid used should almost invariably be ~~hot~~ actually boiling, and care should be taken in the introduction of the grain not to stop the boiling. (latent heat)

If milk is to be used it should be remembered that milk is more dense than water and a ~~less~~ little larger amount of fluid is needed than when water is used.

All the grains except those nearly or wholly composed of starch and ~~a two~~ the very fine meals require a prolonged slow cooking. Why - to thoroughly disintegrate ~~and~~ or break up their tissues for digestion and to aid in converting the starch into dextrine. It is possible to cook grains in

a short time. so they will be palatable, but not the most digestible. Even the so called steam cooked grains require the same prolonged cooking to make them perfectly wholesome. These steam cooked grains are simply grains that have been steamed before grinding and afterwards treated with chemicals, but the process through which they are put does not so change them that they can be cooked easy of digestion in five or ten minutes as is ~~they are~~ advertised. ~~to be cooked~~.

Even the meals which may be cooked in a shorter period are rendered more digestible by longer

& cooking time table insufficiently cooked grain is not easily digested and acts as any other mechanical irritant

Somebody will doubtless object to the long cooking with the ~~question~~ that the amount of fuel required to cook the grains so long costs more than the grains themselves, Doubtless this would be true were ~~the~~ a coal or wood fire kept wholly for this purpose, but the managing housekeeper will be able to cook her grains right along with other foods so that no extra fire or fuel will be needed, and if she chooses she can have a little lamp stove, which will cost her not over $2.00 and which with 10 cents worth of oil a week will cook all her grains with the very least possible trouble. This

is no food with which we can
supply our tables in summer which
gives less trouble to prepare and
more satisfaction to eat than
the grains cooked thus over an oil stove.
Another question will doubtless arise in your
minds, if we are to cook the grains
so long how can we use them for
breakfast — The problem is easily
solved in several ways. The grains
may be cooked the afternoon previous
and as soon as done set aside
where it will cool quickly.
If cooked in a granite ware or
porcelain double boiler it
may be set away in that. In
the morning place the inner cups
in the outer filled with boiling
water and cook until heated through
out without stirring. No addi-
tional water is required in
the morning. In cooking the

10 rolled grains. no additional water will be required at any time for the very coarser grains a half cup additional will be needed, If the grain is not cooked in a double boiler turn into an earthen dish at night & steam in the morning. There are some grains preparations of grains so I have already stated which may be sufficiently cooked in a short time, such are suitable for breakfast dishes — Cooked all night. Used with hot cream

Coarse grain — Stirring.
graham grits —
fine meal — water hot —

Grains while needing to be properly cooked also require to be properly eaten, because they are already

soft and require no mastication
people are apt to swallow them
without proper insalivation.
In order to ~~keep~~ be sure they are
retained in the mouth sufficien
long to be properly insalivated it
is well to eat them with some
hard food as toasted crapers.
What shall be used as dressing?
The majority of people offset
the value of the grains as
an article of diet by the excess
of sugar, which they use on them
which often aids to set up a
fermentive process almost as soon
as it ~~comes~~ reaches the stomach, and if
the grain is not well cooked the ten-
dency to fermentation is much ~~more so~~ greater. Then
too the natural taste of the grain is
wholly obliterated by the sugar

which soon cloys the appetite. I can see no more reason for making use of sugar on grains as a constant accompaniment than to always use cake instead of bread which is made from the grains. I believe this use of sugar is ~~also has~~ ~~much~~ a hindrance to a more common use of the grains and that if people would learn to like them for their own sakes and not for the sake of the sugar, they would soon become a staple article of diet, and the question in the minds of the housekeeper would be not what to get for a meal but what grain shall be taken as the base of the meal and what other articles shall be used

as accessories. The grains as I have already stated being the most nutritious of all foods ought to be the first and staple food, around which all other articles upon the bill of fare are grouped, In making out a bill of fare choose first the grain and then decide what other foods will accord with it, As a dressing for the grain nice sweet cream, fruit juices and fruit sauces are excellent and unobjectionable, Break the toasted wafers over a dish of grains and pour the cream over it and eat while hot and I think there will be but few people who will not prefer it to the more common but less wholesome method of using grains after a few trials.

The use of fruits in connection with the grains is an excellent plan both as a dressing, and a combination and some of the most delicious of dishes may be thus prepared as you will yourselves decide I am sure when you come to the practical lessons, — Fresh fruits or dried fruits as raisins, as sliced bananas, peaches, berries may be used by shredding into the grains while hot just before serving — Most fruits are best not cooked with the grains. If raisins ~~or figs or dates are~~ or currants or figs are to be used they should be first steamed before adding, ~~dates~~ Fruit juices and their fruit pulps may be used as the liquid for cooking some of the grain meals thus forming most delicious dishes." Most grains are best served hot but many of them may be molded and served cold if prepared for a change

15 I have said nothing of the cooking of rice thus far, as rice although a grain and when well cooked an easily digested one but is so largely composed of starch that it is not an especially nutritous ~~one to be~~ and needs to be used in connection with some other food containing the elements it lack. It is I think best cooked by steaming. Wash a cup full very thoroughly - soak in a cup of warm water for one hour add a cup and a half of warm water or a cup of milk and a half cup of water to cook for just one hour,

Luncheons,

PROCESS OF MAKING GRANUT.

Take a given amount of while flour or cerealine, say six pounds; mix this in eighteen pounds of cold water; turn in live steam and cook. When it thickens, add three ounces of crushed dry malt, sifted. This will thin it so it can be thoroughly cooked. When so cooked, it will be quite thin and transparent.

Now add six pounds more of white flour or cerealine and three ounces of crushed and sifted malt and cook as before. This will become thin so that we can add six pounds more of flour or cerealine and 3 oz. of sifted malt. We now have used eighteen pounds of flour or cerealine. Be sure and thoroughly cook this paste.

Now let it cool off to 130 degrees and add nine pounds of crushed and sifted malt. Raise the temperature slowly to 140 degrees and hold it at that for about thirty minutes, then slowly raise to 145 degrees and keep it there fifteen to twenty minutes, again raise to 150 degrees and let it stand fifteen or twenty minutes, then bring temperature slowly up to 180 degrees, then to boiling point.

We will find that the live steam has condensed so that we now have about twenty-seven pounds of water with our eighteen pounds of flour or cerealine and nine pounds of malt, or a batch of fifty-one to fifty-three pounds in all. This should be very sweet and quite thick.

After the flour has been cooked and cooled ready for the malt, the work of digestion can be done nicely in a steam jacket mixing machine, or by placing the can of paste in a can of water and heat by live steam, or we can simply let the live steam into the paste direct, but this latter way would be apt to give us more condensed steam than desired, which would thin the paste down too much. While the process of digestion is going on, it is necessary to stir the paste quite often. The full time for digestion should be from two to three hours.

To the batch of paste, (in this case fifty-one to fifty-three pounds), a dd one-third its weight, or seventeen to eighteen pounds of meltose, specific gravity forty. Now you have about sixty-nine pounds in all. To this add twenty-three pounds white flour, twenty-three pounds graham flour, twenty-three pounds granola siftings, one nd one-half pounds of Nut Meal, four ounces salt. Thoroughly mix. This will give us a stiff dough.

Cut this dough out about four or five inches thick and place on tins. Place tins in steam retort, covering top pans to keep condensed steam from falling into the ~~XXXX~~ dough. Cook at 214 or 215 degrees for five hours. Let it cool off and shred through the larger perforated plate of shredding machine. A knife has been placed on outside of plate with which to cut the shredded dough in pieces about half an inch long.

As this falls into the pan or tray, sift granut siftings over it and work it around by hand until it will not stick together. Now dry it out in some kind of a drier, the Hess Drier is a good one. Be sure and leave in drier until it is thoroughly dry.

Now grind and pack at once as it will soon gather moisture if exposed to the air.

GRANUT.

This is a thoroughly dextrinized cereal food.

The purpose of this invention is to provide a food in which the starch shall be thoroughly dextrinized and in part converted into maltose by the combined action of he t and vegetable diastase. The process consists of the following steps:--

The preparation of a paste is made in the following manner:-- Farinaceous flour of any sort, preferably wheat, corn, barley, rye, oatmeal or rice, is cooked with the addition of water by any suitable means into a very thick paste., After the cooking of the paste, malt grains, preferably ground fine and with the coarse husks removed by bolting through a coarse seive, as described above, are added. The quantity of the malt grains may be varied according to the degree of sweetness desired. The amount may be just sufficient to dextrinize the paste which is shown by the mass becoming thin, or by the addition of a larger amount of barley or grains a considerable amount of the starch may be converted into a form of sugar known as maltose. Some sweetness is derived from the malt grains themselves containing maltose, as well as the diastase and unconverted starch.

After the addition of malt, the mash is digested at a temperature of about 140° for an hour and a half or more, or a sufficient length of time to secure the maximum degree of diastatic action desired.

It is more econ omical to sool the paste to about 120° before the addition of the malt, for the diastatic activity of the malt may be lessened to some degree by the excessive heat, being destroyed at a temperature above 165° .

When a very thick and a very rich paste is desired, the following process may be adopted:-- After the first paste has been made, a very small amount of malt grains is added, just sufficient to thin the paste. More flour

is then added sufficient to form a very thick mass. A second quantity of malt is then added sufficient to thin the mass. The process is continued until the mass becomes as thick as desired.

The next step consists in the addition of dextrinized cereals in a inely ground state. This dextrinized cereal may consist of dried and browned bread crumbs, cracker dust, ground parched wheat or other grains, cooked and thoroughly dried potato or other farinaceous vegetables or any other farinaceous preparations which have been thoroughly cooked and dried. It is prefereable that the cereal should have been subjected to a temperature sufficient to slightly brown it. This renders the process of dextrinization more thorough and complete.

The amount of dextrinized cereal added may vary according to the manner of treatment adopted.

The next step consists of the baking. The mass may be poured into the pans if thin enough, and baked in an oven, or if the amount of dextrinized cereal added is sifficient to make a dough, this may be made into crackers in the usual or large cakes, and baked or dried in the usual manner. As the contents have been thoroughly cooked before, it is only necessary to dry the mixture. The dry mass is then ground into a fine powder or coarse granular meal as may be desired.

This process may be varied by the addition of pulp prepared from mash in the manner described elsewhere, or by the addition of malt or malt honey prepared in the manner described, or both the mash pulp and the malt or malt honey may be used.

An inferior product may be prepared by the addition of cane sugar or glucose, but these substances are considered less healthful than maltose prepared by the diastatic digestion of starch.

Malt or malt honey may be combined with the dextrinized cereals and the mash pulp. Nuts in the form of meal or paste may be added or other substances intended to increase the amount of fatty or nitrogenous elements .

The preparation may be made directly from malt honey or malt, the mash pulp and dextrinized cereals. The cereal, the mash pulp or dried mash flour, the malt or malt honey may be mixed, the dextrinizing of the flour being effected by prolonged baking in the oven or exposing to heat in any other way at a temperature sufficient to dextrinize the starch.

613.2

GRANUTO.

What is it? It is a new name, and not exactly new either; neither is the food exactly new. Granuto is formed from Granut by the addition of the letter O. It is pronounced with the accent on the first syllable, Grá-nut-o.

Our first product in this line was nuttola. This was an excellent food but the method of manufacture was too expensive to permit its going into general use. Later came granut, and now granuto, as the result of extensive labors and expensive experiments.

The central thought of granuto is predigestion. There is a multitude of people who have good appetites and can eat a square meal with relish who cannot digest it after it is eaten, and the result is a "heap sight," as they say in Indiana, of peristaltic woe, high doctors' bills, and perhaps drugs and patent medicines, warranted to cure all ills without "attention to diet," and little medicine titbits which are guaranteed to "work while you sleep."

Granuto is for just such folks, and also other people who eat a lot but cannot get fat; the food doesn't seem to do them any good, is not assimilated. There is no gastric distress but simply a lack of power to assimilate the food. And then there are people who have lost flesh as the result of prolonged fever, overwork, loss of sleep, or excessive taxation of some sort who need to gain flesh and blood rapidly. Granuto is just the thing for such people, for a

nursing mother, a weaning baby or even a baby who is not weaning but whose natural food or the bottle does not agree with it; for children of all ages, for old people and people who are not old. In fact, granuto is a food adapted to all people and all ages.

Granuto is the only predigested food of its kind which is prepared with any sort of attention to scientific principles. Only the choicest materials enter into its composition. It is prepared by experts by methods which are absolutely unique and which have never been used in the preparation of other foods.

Granuto presents a food in which the starch is almost completely digested. This is shown by the fact that when hot water is added to it, 50 to 60 percent or more than one-half its weight is at once dissolved. This portion is digested and ready for immediate absorption as soon as it enters the alimentary canal. Thus prepared granuto affords to the body a larger amount of food material prepared for immediate assimilation than any other cereal food. In flavor, it is sweet, delicate, and toothsome. May be eaten with milk, cream, or fruit juice. Combines readily with all other foods.

We do not say that granuto equals in nutritive value 10 to 12 pounds of any other food, for such a statement could not be true of any food substance. Any person who makes such a claim lays himself open to the charge of gross misrepresentation. We prefer to tell the plain, simple truth about

our products and to present the public with foods which are made on honor and which have for their purpose something higher than mere commercial gain.

In addition to its nutritive properties which are specially those of a fat and blood-building food, granuto has the one unique property in which it outrivals every other similar food. It is not only predigested and easily assimilable to a larger extent than any other cereal food heretofore produced, but it also aids the digestion of other foods to a remarkable extent. Persons who are unable to digest other foods can digest granuto, and many who have difficulty in digesting ordinary wholesome food or who suffer from distress of various sorts after eating find themselves readily relieved when a few spoonfuls of granuto are added to the ordinary bill of fare.

~~Granuto is good; it is sweet; it has remarkable blood making properties.~~ Although granuto has a delicate, sweet flavor, it contains not one grain of cane-sugar, neither does it contain glucose or so-called grape-sugar, a cheap sweet stuff made by adding sulphuric acid to corn starch. The sweetness of granuto is due to the process of manufacture by which the starch of grain is converted into a natural sweet substance known as maltose, the same as is formed by the process of digestion in the alimentary canal.

Granuto is good; it is sweet; it has remarkable blood-making properties. Ask your dealer for it. If you cannot get it, send to us for a sample. We fill orders for

our foods direct when they are not handled by the local dealers. For recipes for making some delicate dishes and desserts from granuto, see page.....

(Have small picture of box at the heading.
Have some recipes for making some delicate dishes from granuto)

(Heading of column)

GRANUTO.

How to Make Into Delicate Dishes and Desserts.

(Advertisement)

GRANUTO.

The Latest and the Best.

It is sweet; it is predigested; it aids digestion. A granular food prepared from cereals and subjected to processes whereby it is almost digested and prepared for immediate assimilation. It is unique and toothsome. It has a delicate flavor of malt honey, contains no cane-sugar, grape-sugar, glucose, or other cheap and harmful sweets. It is a wonderful food and has remarkable nutritive and curative properties. Ask your dealer for it.

Beware of cheap stuffs which somewhat resemble granuto but are wholly unlike it in flavor and contain large quantities of yeast and other questionable substances.

HONEY, A WHOLESOME SWEET

Insects greatly outnumber man and all other living creatures. Some, like locusts, frequently appear in such vast numbers as to obscure the sun, destroy thousands of acres of crops in the field over night and strip entire forests of their foliage. Even grasshoppers, which are found in every garden, in a few sections of the country become so numerous as to be a serious menace to agriculture. That the common fly spreads disease is well known. The mosquito has been proved guilty of disseminating malaria and was a formidable enemy in the Pacific. DDT, one of the most efficient of insecticides, played a prominent role in the success of our campaign against the Japanese by practically freeing large areas from these disease-carrying insects. Cattle and other animals, as well as human beings, are infected with deadly diseases which are transmitted by ticks. The dread plague is spread by fleas found on rats and other animals. Every gardener knows that he must wage an unrelenting battle against insects to produce a good crop of vegetables. Without the help of nicotine and other lethal ~~powerful~~ poisons to hold the enemies of flowers at bay, florists would soon be compelled to go out of business. The remarkable effectiveness of DDT in killing harmful insects and the ease with which it may be disseminated over wide

areas from airplanes has led a number of agricultural experts to warn us that the use of this powerful insecticide, except in a very limited way, be carefully controlled or it will do vastly more harm than good.

While the depredations of the myriads of [redacted] insects of this country each year result in the loss of millions of dollars through the destruction of crops and flowers, the bee, as if to atone for the bad behavior of its millions of relatives, toils industriously for the benefit of man. There are about five thousand different species of bees. Of these everyone is familiar with at least two, the honeybee and the bumblebee. Some bees are wingless, others lead a solitary life and never swarm together in large communities, while still others burrow into the ground or wood where they lay their eggs. Although a number of flies and bees appear to resemble each other, bees may easily be distinguished from flies because they have four wings while the former have only two.

The honeybee lives in a well organized community in which a definite program is laid out for each individual bee and carefully followed. The workers which gather honey toil so arducusly that they are worn out and die in six weeks. The task of supplying replacements and even increasing the

swarm devolves upon a single bee, the queen. Her sole function is to lay eggs, of which she produces a prodigious quantity. When the hive becomes overpopulated, a number of its inhabitants swarm and leave it and set out for a new home. The queen makes provision for this contingency. The eggs which develop into workers are deposited in small cells. Those destined to become queens, however, which are several times as large as ordinary bees, are laid in special compartments which have been enlarged by removing the walls of a few cells. The larvae emerge from the eggs in a few days. They receive special care and food and would all develop into queens if permitted to do so. This, however, would only cause confusion and strife as but one queen is needed. The difficulty is very easily overcome. The first queen to emerge from its cell promptly seeks out the rest, stings them to death and leaves the hive with a sufficient number of followers to establish a new community. The life of a queen is generally three or four years.

Guards are stationed at the entrance of each hive to make certain that bees from another hive do not gain admittance. It is thought that they can identify members of their own community by the sense of smell. Interlopers are driven off or even put to death.

The droning sound which one hears emanating from a hive is produced by its unique ventilating system. A group of bees stationed at the entrance of the hive fan their wings vigorously, thus producing a constant breeze which not only supplies fresh air to the hive but evaporates enough water from the freshly gathered honey to reduce it to the proper consistency.

While the monetary value of the 226,000,000 pounds of honey which bees produced last year in this country is considerable, it represents only a small fraction of the benefit we derived from the unceasing labors of the five hundred billion bees which are scattered over the land. Of far greater value is the enormous task of pollination performed by these little creatures which is necessary for the production of many fruits, vegetables and flowers. When a bee gathers honey in the garden it does not flit from one kind of flower to another, but if it alights upon a rose goes from one blossom to another until the possibilities of the bush have been exhausted before paying any attention to an iris or a lily. It is fortunate that the bee is so systematic as the pollen of ~~x flower~~ one species would, of course, have no effect in fertilizing ~~the~~ another.

Although honey plays but a small part in satisfying the huge appetite

that Americans have developed for sweets, in ancient times it was regarded as a great delicacy and relied upon almost entirely for sweetening. Unfortunately, today the average annual per capita consumption of honey is less than two pounds, while that of cane sugar is more than one hundred, or at least this was true before the war. Honey contains iron, copper and manganese, minerals needed for blood building, as well as the vitamins thiamin, riboflavin, ascorbic acid, pyridoxine, pantothenic acid, and niacin, none of which are supplied by cane sugar.

The flavor and mineral content of honey are determined by the flowers from which the bees gather the nectar of which it is composed. Dark honey is richer in minerals than light. In the eastern states white clover, which produces a very light colored product, is regarded as the best, while in the West the rather dark alfalfa honey is said to be unexcelled. Buckwheat is exceedingly strong, basswood has the flavor of mint, while the wild honeys of Mexico and Cuba are frequently highly aromatic.

Very little honey is sold in the original combs as they come from the apiary, but it is extracted by means of a centrifugal process. Strained honey of highest quality is in every way equal to comb honey. Formerly

honey was frequently adulterated with cheaper sweets, but our pure food laws now protect us against this deception. A variety of honeys are frequently mixed together to secure a delicious blend.

Honey possesses remarkable keeping qualities, but it should not be stored in a cool, damp cellar. As it is highly hygroscopic, it will absorb considerable moisture, assume a darker hue and be covered with a film of water. It will keep well, however, in a dry attic although the temperature may rise to more than one hundred degrees. When kept for a considerable length of time, especially if exposed to low temperatures, the consistency of honey changes from that of a semi-liquid to a semi-granular condition which is called candied honey. This change in consistency is accompanied by alteration of its flavor. The tendency to "candy" is pretty good evidence that the honey is pure.

Honey may be used in place of cane sugar on cereals and fruit, in fruit drinks, baking and in many other ways. If even a small quantity of honey is used in the preparation of bread, the flavor of the loaf will not only be improved but it will remain fresh longer than ordinary bread. Honey is recommended by many physicians instead of cane sugar products, especially

for children, not only because it possesses great taste appeal and is slightly laxative but also because it supplies the minerals needed for blood building and essential vitamins, all of which are lacking in cane sugar.

Honey is excellent as a quick source of energy as it is ready for immediate absorption into the blood. It has from ancient times been employed as a remedy in a great variety of disorders, and because of its pleasant taste and soothing properties is still frequently an ingredient of many cough remedies. Honey has even been used in the treatment of wounds. It is said to possess bactericidal power. Applications of honey to ulcerated surfaces cause lymph, rich in white blood cells, to pour out freely which not only possesses germ-destroying properties but assists in cleansing the wound and promoting healing. As the dressing does not adhere to the wound, it may be easily changed.

Although a hive of about fifty thousand bees will produce two to three pounds of honey a day during the season, it is not the purpose of this article to give the impression that all the reader needs to do to assure himself of an ample amount of sweetening for his table is to purchase a hive of bees and

set them out in the back yard. Producing honey is not so simple as this. Authoritative books, however, are available which give such full information about bee keeping that any patient, intelligent person may soon acquire enough knowledge of the habits of these little creatures to keep them contented and producing honey.

Use more honey. We believe that every well informed dietitian will agree that substituting honey for cane sugar whenever possible would improve the dietary as well as the health of the people of this country.

613.2

(Nut Cracker, First Page)

KERNELS.

Nuts are not only the most toothsome, but the most nourishing of all foods.

A pound of pecans, hickory nuts, almonds, or peanuts contains more nourishment than three pounds of the best beefsteak.

Beefsteak contains 14 grains of uric acid to the pound; nuts contain no uric acid.

Two pounds of nuts contain more fat than a pound of butter; hence nuts are fattening.

Butter fat is difficult of digestion; nut fat in its natural state is emulsified and imposes little or no tax upon the digestive organs.

Nuts are great blood-builders. One pound of nuts is equal to two pounds of beefsteak for blood building.

Nuts in their natural state or properly prepared should constitute a portion of each meal.

Nuts and fruit constitute a perfect and complete dietary, fully capable of sustaining a high degree of health and strength.

The oldest resident of the United States, an Indian, died in California recently at the advanced age of more than 140 years. His chief food all his life had been nuts gathered from the forest.

That nuts are a perfect substitute for meat is shown by the fact that dogs and even wolves as well as other carnivorous animals are very fond of nuts and readily accept them as a substitute for meat.

Nuts contain nerve-building elements in great abundance.

The hardies Coolies of Northern China subsist very largely upon peanuts which take the place of meat.

In Samoa men, women, children, donkeys, cows, chickens, and dogs subsist and thrive upon cocoanuts which are eaten both in the ripe and green stage.

Nut cream prepared by adding water to crushed nuts is a perfect substitute for milk.

A substance closely resembling cheese but much more toothsome and digestible may readily be prepared from peanuts and other nuts.

A perfect substitute for meat not only in appearance and consistency but also in flavor and food value ----its name is Protose.

The Samoans make delicious cream and a snow white butter from the flesh of ripe cocoanuts. The manufacture of this remarkable product has recently been perfected in this country.

Karl Mann, the German pedestrian who holds the world's record for long distance walking, when walking a race, subsists almost exclusively upon Sanitas nut products.

The choicest and most digestible nuts are the pecan, almond, filbert, hickory nut, the chestnut, and the peanut. The last two mentioned should be cooked on account of the starch which they contain.

Roasted peanuts are highly indigestible as well as peanut butter made from roasted nuts.

Fresh nuts readily become rancid and unfit to eat when not properly cared for.

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613.2

Lac-Vegetal:

Some years ago we experimented extensively for the purpose of producing a vegetable substitute for cow's milk. The necessity for this has been long pressed upon us on account of the increased frequency of tubercular disease and because of the fact that tubercular germs may be present in milk, butter, and cheese, although the animal from which the milk was obtained may appear to be in perfect health. It is only a question of time when cows will become practically universally infected with this rapidly spreading plague. Our efforts were only partially successful. The products manufactured did not reach the standard for sanitas foods. We accordingly suspended its manufacture until futther experiments would enable us to supply our patrons with something we could thoroughly recommend to them as certain to meet their highest expectations. This we are now able to present in our new LAC-VEGETAL, which far surpasses anything which has before been produced in this line.

LAC-VEGETAL has not only the appearance, but to a remarkable degree also, the composition of cow's milk; but differs from it in the fact that it is absolutely free from germs as well as from animal substances of every sort, and that it is easily digestible and of exceedingly delicate and delicious flavor. Unlike most other artificial substitutes for milk, it is absolutely free from cane sugar, which is a source of wide-spread gastric mischief among invalids. Its delicious sweetness is due to Malt honey, a new saccharine product of our own discovery and manufacture, a natural sweet which is exactly adapted to the needs of the body and may be taken freely

without injury by the youngest infant. Lac-Vegetal is a perfect substitute for milk and may be relied upon in the feeding of infants, invalids, and persons of all ages and conditions. In using, it is only necessary to add water, hot or cold, until the desired degree of dilution is obtained.

THE NUTRITIVE VALUE OF LIME

THE NUTRITIVE VALUE OF LIME

by J. H. Kellogg, M. D.

Taken by itself, in its mineral form, lime possesses no food value, or at least only under exceptional circumstances, as when the body is deprived wholly of lime from other sources. Even then, mineral lime can beautilized only in the very small quantities. It was, indeed, long a mooted question among physiologists whether inorganic lime ever could be utilized by the animal organism. In recent years carefully conducted experiments by Mendel and Osborn, as well as other investigators, have shown that when an animal is fed with food from which lime has been excluded, the deficiency may be made up by feeding inorganic lime; but it is evident that this use of mineral lime is exceptional and the biologic law that vegetables feed upon mineral substances and animals upon organic matters build up by vegetable organisms working under the influence of the sun's rays, still holds good.

Recent experimental studies in the feeding of animals have placed in a very clear light the importance of lime as a constitutent of the food. The facts recently emphasized are not altogether new, but the need of giving constant and special attention to the lime content of foodstuffs is in the light of recent studies now more fully appreciated than ever before.

A few facts concerning the uses of lime in the body will be of interest.

The great importance of lime is suggested by the fact that this one element constitutes fully three-fourths of the total mineral content of the human body. The body of a man weighing 154# contains about 4½# of lime, or 3% of the body weight.

Nearly all the lime of the body (99%) is found in the bones, the soft parts containing only 1% of the total lime content of the tissues. This fact explains the deficiency of lime in flesh foods.

All the elements of the tissues are in a state of constant change. This is true of the salts and of the lime as well as of other food essentials. An adult loses two-thirds of a gram or about ten grains of lime, daily, the waste lime being

excreted chiefly through the intestine, but to some extent through the kidneys. This loss of lime is constant, even during fasting. It is evident, then, that in order that the store of lime in the body should be kept intact, the daily food supply must contain not less than ten grains of lime. In fact, to provide for emergencies and the failure of the absorbents to take up all the lime contained in the food it is found to be necessary to supply in the food about fifty percent more than the actual requirements of fifteen grains of lime daily. Some authorities demand more than this.

Unfortunately, the food commonly eaten does not always contain this amount. Indeed, Dr. Sherman of Columbia University calculates that at least half the people of the United States are suffering from lime starvation. Probably lime is more often deficient in the dietary of the average American than any other element with the exception of iron and cellulose, or woody fibre needed for roughage.

The fact that lime is found in every bodily tissue, bones, soft tissues, blood and other fluids, indicates its universal importance in the body.

1. To the bones it gives solidity. The bones of the adult are more than half lime. The amount of lime in the bones is so great that a burned bone retains its form even though the animal part has been wholly destroyed by fire.

2. The ability of the muscles to contract and to do work depends not alone upon their development and to the presence of fuel sugar in the blood and glycogen in the muscles, but also upon just the right proportion of lime in the blood.

3. The blood contains a very small proportion of lime, only about 5½ grains to the pint (cow's milk contains fifteen times as much) but this small amount is absolutely essential to maintain the normal beating of the heart through its influence upon the heart muscle. The mammal heart has been kept beating for hours after removal from the body by passing through it a solution of lime and other blood salts.

4. Again it is known that the presence of this minute amount of lime in the blood is essential to enable the blood to coagulate as in clotting to stop the flow of blood from a wounded vessel.

A careful surgeon always examines the patient's blood and determines the coagulation time before undertaking a serious operation. When coagulation is delayed, lime is administered for a few days before the operation is performed.

The relation of lime to the development of the bones is well shown by an experiment upon puppies. Those fed on lean meat and fat only, had soft and flexible bones. Puppies to which bones were given, gnawed at the bones and thus obtained the necessary lime development normally.

Voit, an eminent physiologist who devoted his life to the study of food problems, fed pigeons for a year on foodstuffs which were greatly deficient in lime. There seemed to be no change in the birds which appeared to be in perfect health, but after they were killed, careful examination showed that while the leg and wing bones contained the normal amount of lime, the bones of the head were almost wholly deprived of lime being greatly thinned, and at some points actually perforated. Evidently the body had sought to maintain the normal blood content of lime by robbing those parts of the skeleton from which it could best be spared. The leg bones being spared because of the need of preserving their rigidity for purposes of locomotion.

Sherman, of Columbia, repeated Voit's experiment, employing monkeys instead of pigeons. The results were the same. The leg and arm bones did not suffer m much, but the skull bones lost their lime almost altogether, becoming so thin that they could be crushed between the thumb and fingers as easily as an eggshell.

Some years ago the authorities in charge of the London Zoo observed that the lions were deformed, bowlegged, clubfooted, dwarfed and always died young, Treves, an eminent London surgeon, was consulted. He noted the evidences of rickets and asked about the food given them. He was informed that they were given the very best of meats. He suggested the feeding of bones and bone meal. His advice being followed, the deformities soon dissapeared, and the cubs ceased to die prematurely.

The cave dwellers, who in prehistoric times were compelled by the rigors of the ice age to subsist on the flesh diet, rounded out their diet by splitting

becomes very deficient in lime during the last months of gestation.

Infants and young children require two or three times as much lime in proportion to their weight as do adults, since they need lime for building up and solidifying the skeleton as well as for making good the daily waste. A young nursing infant gets daily in its mother's milk, more than seven grains of lime, or half as much as the daily requirement for an adult.

The wonderful care which Nature takes to supply the young animal with an abundance of lime for building its skeleton is will illustrated in this interesting case of the egg. According to the annuls of the Pasteur Institute before incubating, the contents of an egg contains one-half grain of lime. During incubation, the amount steadily increases until when hatched the body of the chick contains three grains, of six times as much lime as at first. The growing chick has in some mysterious way, not yet determined, managed to steal from the shell the needed lime for stiffening its slender leg bones so as to enable them to support its body as soon as it emerges from its calcareous cell. It thus appears that the egg shell is not simply a container but also serves as a store house of lime to be drawn upon by the developing chick. Herbst has shown that between the ages of 6 to 14 boys require three or four times as much lime in proportion to their weight as do adults, since they must store up in their growing bones, 3 to 6 grains of lime daily, or about one-third of the adult lime ration.

It is evident, then, that the lime dontent of our daily food is a matter which needs most serious and unremitting attention.

The Lime Content of Foods

The proportion of lime found in different foodstuffs varies greatly. This fact is of much importance in view of the recent observations of Osborne and Mendel as well as of other investigators who have undertaken exhaustive experiments in animal feeding, and have shown that rats do not grow develop and reproduce normally unless supplied with a full quota of lime.

If the assertion of Professor Sherman that "half the American people are

suffering from lime starvation" is true, and there is no reason to doubt it; the study of foods with reference to their lime content is highly essential to our understanding of rational dietetics. This study has heretofore been greatly neglected.

First of all it is interesting to note that in general, roots and the green parts of plants (greens) are richest in lime. The legumes (beans, peas and lentile) and certain nuts (almonds, hazelnuts and walnuts) are also rich in lime. Of the grains, oatmeal is the only one which presents a fair proportion of lime. Wheat and corn are both very deficient in lime, and rice contains no lime at all.

Of all natural food products, the richest in lime are the hazelnut, the almond and linseed meal. The last named product, though not commonly used as a food may be resorted to in emergency and is doubtless entirely wholesome.

Milk is so rich in lime that a pint and a quarter contains sufficient of this necessary element for a full day's supply. But an equal amount of lime would be furnished by half the weight of almonds, and eight or one ounces of hazelnuts will supply the same quantity, or six ounces of linseed meal.

The foods which contain the largest proportion of lime and in the order named are,-- cheese, cottage cheese, hazelnuts, almonds molasses, beans, chard, and other greens, eggyolk, wheat bran, milk, skimmed milk, olives. In milk the lime is closely associated with the caseine which forms the curd. Milk contains more lime than is found in lime water, a naturated solution of lime.

In cheese the lime is of course concentrated, the proportion being about six times as great as in milk.

Since skimmed milk contains practically as much lime as does whole milk, it is a highly useful article of food. Not a drop should be wasted. By combining with other foodstuffs as in bread and other cereal preparations, with the addition of fat, it may be very advantageously made a regular part of the daily bill of fare.

The feeding of skimmed milk to pigs is a foolish waste. Our growing boys and girls need every drop of milk which the country produces.

We are losing our teeth and shrinking in stature because we need more lime and milk is one of our most important sources of food lime.

The amount of lime required by the average adult is three-fourths of a grain for each 100 calories of food or about 15 grains a day for a person taking a ration of 2000 calories. This amounts to 4/5 of a pound per annum for each man, woman and child in the United States aggregating a total lime requirement for the country of 40,000 tons per annum.

That the nation fails to get its full lime ration is due in part to the wasting of milk in our dairy industry and in part to the fact that we unwisely deprive ourselves of an essential food element by feeding the bran of our wheat and other foodstuffs rich in lime to hogs and cattle instead of making use of them ourselves. As a natural result, our domestic animals are steadily improving in physical development while as a nation we are delining in vigor and showing distinct indications of physical degeneracy.

It is interesting to note that our wide awake agricultural department at Washington is advising the people to buy milk instead of meat, pointing out that its nurtitive value is far greater. Even whey contains a notable amount of lime, more than a third as much as whole milk, but less than a twentieth as much as cheese. However, the amount is so large that it should be utilized when possible. When fresh, or only slightly acid, whey is a wholesome food having about one third the value of whole milk.

Wheat bran contains as much lime as does milk, but of course it cannot be taken in so great quantities as milk and hence is less available as a source of lime.

It is interesting to note that molasses contains a good proportion of lime, more than three times as much as is found in oatmeal, and nearly twice as much a in milk. In this respect, molasses is superior to sugar, which contains no lime at all. In molasses, the lime found in the natural juices of the cane is concentrated; it is probable that the lime used in the manufacture of sugar may be the source of part of the lime in molasses. Maple syrup contains half as

much lime as molasses.

A careful study of the accompanying tables # will develope a considerable fund of most useful and interestin" information.

Table 1 shows, in column (1) the number of grains of lime (CaO) found in one ounce of edible substance. By the use of the figures given in this column one may easily calculate the amount of lime in his daily food, bearing in mind that the minimum requirement is one gram or 15.4 grains per diem.

It is only necessary to obtain for each serving the amount of lime by multiplying the weight in ounces by the figures of column (1). Adding together the figures obtained for all the different servings constituting the bills of fare for the day we find the number of grains of lime eaten, which should be 15 grains or more and never less. The writer recently listened to a lecturer, a young woman sent out by the state health department to instruct mothers in the fine art of feeding their households. Said the lecturer," do not spend one cent for meat until you have provided at least one pint of milk for every member of the family." This sensible instruction, endorsed by the highest authorities in the nation, is being spread broadcast over the country by lecturers sent out by state health boards and agricultural colleges and experiment stations, and great good is being accomplished by making them acquainted with the value of milk as an effecient means of balancing the bill of fare.

Column (2) of Table 1 shows the percentage of one day's lime ration (15.4 grains) found in one ounce. The figures in this column will be found most useful in balancing a bill of fare from the weight of the several items composing it. Multiply the ounce percentage given by the number of ounces of each food eaten. Add all the percentages together. If the sum is one hundred or more, then we know that the amount of lime is sufficient. A surplus does no harm, being easily disposed of with the excretory waste through the intestine and the kidneys.

#Foot note-- The accompaning tables are chiefly based upon the excellent tables of Sherman. See "Chemistry of Food and Nutrition" Macmillan Co.

Column (3) of Table (1) shows the amount of edible substance required to furnish 15.4 grains of lime. These figures may likewise be used in determining the amount of lime in one's daily ration, and sometimes more conveniently than the figures of column (1).

Column (4) shows the percent of the daily requirement supplied by 100 calories of the given foodstuff.

In column (5) is found the amount (ounces) of food necessary to supply 100 calories of edible substance, information of essential value in determining the lime content of servings.

Column (6) gives the weight of an ordinary serving, and column (7) shows the number of calories found in an ordinary serving. In estimating the lime content of a day's ration it is only necessary to set down and add up the figures representing the percents of the lime ration found in the several servings. These figures are easily found by comparing columns (4) and(7), remembering that the figures of column (4) are based upon portions of 100 calories each. These figures are increased or diminished according as the serving is more or less than 100 calories, and in proportion to the difference. When the serving is 100 calories, the figures found in column (4) are used directly. If the serving is 50 calories, then the figures of column (4) would be divided by two. If 25 calories, divide by four, etc. If the sum of all the values is 100, then the lime content of the daily ration equals 15.4 grains, the normal requirements.

A few simple examples will illustrate the use of Table 1.

Suppose, for example, that one takes with his breakfast, 2 eggs, 1 ounce of cottage cheese, 8 ounces of milk, 1 ounce of almonds, 2 ounces of oatmeal (weighed dry), an ounce of wheat bran and 1 ounce of molasses. Let us see what proportion of his daily need of lime will be supplied by these foods. The almonds will supply 1/10 the days lime ration, the oatmeal a little more than 1/20, the bran 1/20, the eggs 1/10, the cottage cheese 3/10, the molasses 1/10, making in all 7/10 of the total requirement, more than is needed , for 3/10 for breakfast would be quite sufficient if one eats three meals a day.

Evidently, it is easy enough to secure an adequate amount of lime by simply giving the matter the attention it deserves.

Foods Deficient in Lime

It is very instructive to note the great number of common foods which in the form in which they appear upon our tables are almost wholly lacking in lime. The table shows, in fact, more than fifty common foods which are so poor in lime that one would need to eat not less than six pounds to obtain an adequate amount of lime for a single day. In some instances the lime content is so small that the amount of foodstuff necessary to furnish a day's ration rises to ten, twenty, and even forty pounds.

Among the foods most deficient in lime may be mentioned the following: cane sugar, which contains no lime; honey, which supplies in one pound of wax-free material, only one fortieth of the lime needed for one day. Apples, bananas, beef and other meats, butter, also lard and oils of all sorts, most of the cereals and nearly all fruits are deficient in lime.

But now let us study more intensely the different classes of foodstuffs, milk, meat, eggs, cereals, and breads, vegetables, greens, legumes, fruits and nuts. For the readers convenience we have arranged these foods in separate tables.

First, let us notice the list of fruits. (See Table II)

A characteristic of fruits in general is their small lime content. The average amount of lime in 28 of our commonly used fruits is one-eighth gram(.123) per ounce, requiring 123 ounces for one day's supply of lime (15.4 grains), more than is demanded of any other class of foods with the exception of meats which require the consumption of 270 ounces, more than 17 pounds, an impossible amount for anyone but an Eskimo.

It is important to observe, however, that there are some very noteworthy exceptions to the general rule of low lime content in fruits. Zante currants are rich in lime, containing half a grain to the ounce, or four times as much as the average of all fruits. The olive affords three-quarters of a grain to the ounce and the fig, which has been a choice foodstaple for millions in the Orient from

For example, the apple contains so little lime that one would have to eat 22 pounds daily to get his supply if dependent on this source alone. The banana is almost equally deficient, requiring 17 pounds for a day's ration. The tomato yields a day's supply in 14 pounds, the watermelon in equal quantity, the pear and the peach in 10 pounds and the cantaloupe in 9 pounds. In other words, the proportion of lime in these fruits is so small that it may be ignored in estimating the lime content of rations or bills of fare.

THE LIME CONTENT OF NUTS. (Table III)

Nuts are botanically classed as fruits, but from a dietetic standpoint they are placed in a class by themselves.

Nuts are of all foods the most concentrated; that is, they furnish the largest amount of nourishment in the smallest bulk. No other foodstuffs are so rich in protein and fats. Fruits, with the exception of the olive, contain only very small proportions of either fat or protein, their chief food constitutent being carbohydrate,- sugar, starch, dextrine, and acids.

In proportion to their weight, nuts contain more lime than any other class of foodstuffs except legumes, the average being more than one-third grain to the ounde (.370 grs.). Certain nuts are surprisingly rich in lime. For example the almond offers nearly one and a half grains to the ounce, while the hazelnut or filbert affords one and three-quarters grains of lime to the ounce, or 11.3 percent of a day's ration of lime. The pecan and the walnut are also fairly rich in lime, as is also the peanut. The average weight of nuts required to supply a day's ration of lime, excluding the cocoanut, which is very poor in lime, is 28.7 ounces less than the average of any other class of foodstuffs.

An ounce and a half each of almonds and hazelnuts or filberts will supply one-third the total lime requirement for a day. In general, this addition to the ordinary bill of fare would be quite sufficient guarantee against any serious deficiency of lime.

By a combination of the proper nuts and fruits, the most delicious of all food combinations, the total needed supply of lime, or at least the major part of it, may be readily secured.

remote ages, supplies a whole grain of lime to each ounce, or a day's lime ration in less than one pound of the dried fruit, and one-third as much as in the same quantity of figs fresh from the tree.

Fruits Richest in Lime. (See Table IIa)

The following fruits are richest in lime content, containing double the general average for fruits: Each of the above fruits supplies a sufficient amount of lime in an ordinary serving to constitute a substantial contribution to the lime ration.

Especially noteworthy is the orange. An orange of average size (5 oz.) will supply one-tenth of the total lime requirement for a day, and an ordinary glassful of orange juice (6 oz.) supplies three fourths as much. The importance of the orange as a source of lime has heretofore been less appreciated than it deserves. It is quite possible that the great value of orange juice in infant feeding as a preventive of scurvy is in part due to its lime content. Four or five oranges a day will furnish more than one-third the necessary amount of food lime, and a glassful of orange juice at each meal will go far toward making good the deficiency of lime in the ordinary diet.

A large orange and a dish of prunes for breakfast, two ounces each of figs and ripe olives for dinner, and a liberal helping of fresh strawberries or rasberries for supper, will supply more than half the needful lime requirement for one day.

Fruits are thus seen to be really practical means for replenishing as well as maintaining the lime supply of the body, a need which our ordinary bills of fare w wholly ignore.

And fruits have the advantage not only of being a most agreeable form of aliment, but a most reliable source of lime, since they are not likely to be robbed of their mineral constitutents by the misguided efforts of these experts in denaturing and sophisticating foodstuffs, the manufacturers, canners and cooks.

Before leaving this interesting class of foodstuffs it may be well to note the fact that quite a number of our most commonly used fruits are very deficient in lime salts.

Here is a convenient example which may well serve as a model supplementary lime ration for general use. Take at one meal a large orange and an ounce and a half of almonds. At another meal, an ounce and a half of filberts and two ounces of figs. These nuts and fruits would supply sixty percent of the necessary lime and by adding for a third meal another orange and an ounce of walnuts more than four-fifths of the total lime requirement would be furnished.

Evidently there is no need of lime starvation if one only knows how to make a right selection of foods.

THE LIME CONTENT OF CEREALS. (Table IV)

But we have only begun to explore the lime resources of our common foods. There are riches in abundance at our command when we once learn where to find them.

Let us now consider the great family of cereals and seeds from which we derive our breads and breakfast foods, and which serve as the staple foods for most of the members of the human family.

Of the six great cereals, wheat, corn, barley, rye, oatmeal, and rice, the last named feeds many millions more of human beings than any of the others. The countless millions of the Orient are fed chiefly upon rice. Both polished and brown rice are in use through out the densely populated countries of Asia, from Korea to Java. Of all the cereals and the several seeds which serve lime purposes, rice contains the least lime, only one-fourteenth of a grain (.073grs) per ounce in brown rice and one eighteenth (.055 grs.) in polished rice. Wheat contains four times as much lime as brown rice, rye five times as much, and oatmeal six times. Corn is the only rival of rice in poverty of lime, having only a little more than one-fourth as much lime as oatmeal.

Instinct seems to have informed the Orientals of the deficiency of rice in lime salts, for they invariably combine with it a liberal amount of legumes of some sort or of greens or fresh or salted and dried turnips. All of which, as we shall see presently, are very rich in lime salts.

The good results of this liberal supply of food lime are well shown in the tall and brawny figures of the Scotch Highlanders and doubtless accounts for the world wide reputation for vigor and toughness enjoyed by these hardy grainfeeders. a fact recognized in the well known story of a contraversy between Dr. Samuel Johnson and a Scotchman who upbraided the lexicographer because in his dictionary he defined oatmeal as "food for horses in England and for men in Scotland."

"But is it not true?" said the learned doctor.

"Yes, it is true," said the Scotchman after hesitating a moment, then added, "And where do you find such foine horses as in England and such foine men as in Scotland?"

In the United States oatmeal is comparatively a new acquaintance. It was not until the "Centennial Exhibition" at Philadelphia where oatmeal was very adroitly exploited as "Avena" that this cereal came into favor as a breakfast food.

In more recent years, oatmeal has been largely displaced by toasted flakes and other breakfast foods made popular by adroit advertising. And unfortunately, when eaten, the actual amount of the dry material in an ordinary serving of cornflakes or rice flakes is little more than an ounce and hence the amount of lime supplied is too small to cut any figure of importance in the lime ration.

A cereal product which has long been used by farmers in the feeding of horses, cattle, pigs and chickens, but has only recently come into use by human beings, is wheat bran. While low in caloric value, as its chief constituent is cellulose, bran is a most valuable supplementary food, not only as a source of bulk to stinulate the intestines, but as a source of lime and iron. Every ounce of bran contains three quarters of a grain of lime, sufficient to balance one hundred calories of food principles. By the addition of sterilized bran in liberal quantity, the deficiency in lime of various cereal preparations, breads, mushes, etc. may be made up. Bran may also be added to potatoes and other vegetables which are deficient in lime.

Finally, it must be said concerning the cereals that while they are the world's staple foods for working animals as well as for working men, they are perhaps made to constitute a somewhat too large proportion of the bill of fare in most civilized countries. As pointed out by Bunge many years ago, and confirmed by other authorities, the cereals contain an excess of the fixed adids, particularly sulphuric acid, and on this account, when used too freely they upset the nice balance between acids and bases or alkalies in the body, and produce a relative acidosis to which numerous ailments are attributed. This tendency may be successfully combated by the liberal use of fruits and vegetables, especially potatoes, which contain an excess of bases, although greatly deficient in lime, a fact which must be born in mind and which requires compensation by the addition of a suitable amount of foods rich in lime salts.

The Lime Content of Vegetables

In studying vegetables with reference to their lime content, one is struck by the fact that among a dozen commonly used vegetables, omitting "greens" there is not a single one in which the lime salts are largely represented. The average lime content is one-tenth grain to the ounce, almost the same as that of dereals. Lime is found, however, in notable quantities in certain other vegetables.

Parsnips, onions, string beans and Kohl-rabi are comparatively rich in lime, supplying in an ordinary serving, respectively, 7.7, 3.4, 3.0 and 12.2 percents of the total day's needs.

Because of their bulky nature vegetables may be eaten in much larger quantity than the condentrated cereals, and so a liberal intake of lime may be made in eating vegetables in which the percentage of lime is comparatively small. The turnip, for example, contains less than .4 of a grain of lime to the ounce, but an ordinary serving is 4.5 ounces, which supplies more than one-tenth (11.4 percent) of a day's lime ration.

Hence nearly all the vegetables may supply a considerable amount of food lime, when in their natural state, or when cooked by steam or oven heat; but if

boiled, when removed from the water in which they have been boiled they leave behind a large part of their content of lime and other food salts. Vegetables should always be steamed or baked rather than boiled, so as to preserve the so-called inorganic elements, which are as essential to animal and human life as to the lives of plants.

Of all the vegetables, the eggplant contains the least lime, so little in fact as to be hardly worth noting. The amount found in an ordinary liberal serving is only one-tenth of a grain. Next in order of deficiency is our most commonly used vegetables, the Irish potato which presents a lime content of only one-twelfth of a grain (.086 grs.) to the ounce, requiring the impractical amount of 11 pounds for a full lime ration. It is well to note just here, however, that the potato is rich in iron.

The sweet potato contains a little more lime than the Irish potato but is still very deficient in this essential element. Evidently the potato cannot be safely used as a staple without supplementing it by other foodstuffs, which are rich in lime. Prof. Hindhede, who has devoted his life to food research and with most extraordinary benefit to his country and the whole civilized world, has shown that human life and energy may be well sustained for an indefinite time on a potato diet. A private letter recently received from Professor Hinhede by the writer states that in his potato-feeding experiments which are still in progress he finds it necessary to add to the potato liberal quantities of greens. The greens supply not only a sufficient amount of lime, but also the essential fat-soluble vitamines which the potato lacks. If a days ration contains all of any one of the following groups of foods, rich in lime, the danger of lime starvation will be reduced to a minimum:-

A large orange,
Almonds, 1½ ounces,
Oatmeal, 2 servings,
Parsnips, liberal serving,
Graham bread, 2 servings,
Bran, 1½ ounces

Figs, 2½ ounces,
Olives, ripe, 2 ounces
Cracked wheat, 2 servings
Boston Brown bread, 2 servings
Onions,
Green peas,
Bran, 1 ounce,
Raspberries,

Dates, 2 ounces,	Orange juice,
Strawberries, 2 servings,	Orange, large
Filberts, 2 servings,	Walnuts, 1½ ounces
Oatmeal, 2 servings,	Rye bread, entire, 2 servings
Graham bread, 2 servings,	Shredded wheat, 2 ounces
Kohl-rabi, 2 servings,	String beans, 2 servings
Bran, 1 ounce	Bran, 1 ounce.

THE LIME CONTENT OF LEGUMES (Table VI)

But, while we have found it possible to obtain from the foodstuffs already studied, fruits, nuts, cereals and vegetables, a bare sufficiency of lime, there are in other classes of foods rich supplies of lime salts adequate to furnish even a superabundance of this highly important, but most neglected of all food principles. The legumes and some other allied seeds, for example, furnish in small bulk so large a store of lime that they are most useful in balancing up the bill of fare. This may be clearly seen by reference to Table VI, which shows us that an ounce of beans contains a grain of lime. An ordinary serving represents about an ounce and a quarter of dry beans, which would supply 8 per-cent or one-twelfth of a day's ration.

Peas have a lime content about half that of beans and lentils, two-thirds as much as beans. When made a staple of the bill of fare, the size of servings may be increased to two or even three times the ordinary, making the bean supply nearly one-fifth of the day's ration.

Mention must also be made of two seeds which are not fully established as human foodstuffs, cottonseed meal and linseed meal. Both of these products are exceedingly rich in lime, cottonseed meal containing 1.6 grains of lime to the ounce and linseed 2.5 grains. Cottonseed meal has been much used in feeding stock, though not always without injurious effects. In time the objections to the use of this concentrated food by human beings may be overcome; but we have already a sufficient number of foods rich in lime to furnish an ample supply if a judicious selection is made, so that the use of cottonseed or linseed is not necessary.

A word of caution must said in relation to the use of legumes. The elaborate feeding experiments of McCollum have shown that the protein of beans is of

Mention must also be made of two seeds which are not yet fully established as human foodstuffs, cottonseed meal and linseed meal. Both of these products are exceedingly rich in lime, cottonseed meal containing 1.6 grains of lime to the ounce and linseed 2.5 grains. Cottonseed meal has been much used in feeding stock, though not always without injurious effects. In time the objections to the use of this concentrated food by human beings may be overcome; but we have already sufficient number of foods rich in lime to furnish an ample supply if a judicious selection is made, so that the use of cottonseed or linseed is not necessary.

A word of caution must be said in relation to the use of legumes. The elaborate feeding experiments of McCollum have shown that the protein of beans is of inferior quality and by no means a substitute for the fine protein of milk. It has for some time been known that proteins differ greatly in value. This is particularly true of vegetable protein. The proteins of rice and of potato being of high quality, while those of most green vegetables are of low value. But it remained for McCollum to show by his most interesting and valuable experiments in the feeding of rats that the large protein content of beans is of inferior value. This discovery has deprived the bean of its high rank as a source of protein and as a substitute for high priced proteins. This fact is important in this connection because of the possible injury in making the diet consist so largely of beans as to overburden the body with the elimination of unusable protein. The proteins of peas and lentils are superior to those of beans; hence it is advisable to utilize these legumes more largely than beans as a source of food lime and its associated protein.

When the soya bean has become well established in this country as a food product, it will be doubtless recognized as a superior source upon which to draw for extra supplies of a fine quality, of both food lime and vegetable protein. The Soya bean possesses a percentage of mineral salts including lime more than double that of the ordinary bean.

THE LIME CONTENT OF GREENS.

There still remains to be studied one more class of vegetable food products as a source of lime salts, namely, greens. There seems to be in man as well as in lower animals an instinctive recognition of the important position held by these

coarse and relatively innutritious products in Nature's scheme of nutrition. The craving for greenstuffs experienced by nearly everyone as Spring approaches, is the natural consequence of the widespread lime starvation imposed by a winter dietary from which foodstuffs rich in lime are largely excluded. It is true that this deficiency in lime, almost universally characteristic of winter dietaries, is not necessary, and may be easily prevented by a proper selection of readily accessible foodstuffs; but, unfortunately, the fundamental facts respecting the lime content of foods have only recently been brought to light through the researches, most laborious and painstaking, of the eminent Professor Bunge of Switzerland, and more recently by Dr. Sherman of Columbia University of New York. These facts are as yet practically unknown to the general public which is the reason for the present writing.

In proportion to their nurtitive value, there is no class of foodstuffs so rich in lime as are greens as shown in Table VII. For example, polished rice contains one part of lime in two thousand calories; cornmeal, one part to nine hundred calories; beans, one to six hundred; whole wheat, one to four hundred; hazelnuts one to one hundred; while in asparagus we find one part of lime to thirty calories; in cabbage one to twenty-four; cucumbers, one to fifty; dandelion, one to twenty-five; and in chard and celery, one to twelve.

Considered from the standpoint of bulk and weight, the the situation is decidedly different. With a few exceptions, the lime content per ounce is not greater in "greens" than in many other vegetables. Notable exceptions are, chard, with a grain to the ounce; mustard greens, with 3 grains; paprika, nearly 1½ grains; turnip tops, 2 grains, and watercress with more than a grain.

As will be seen by a careful study of Table VII, there is a marked difference between the different species of greenstuffs. Brussels sprouts, cucumbers, lettuce and tomaine contribute to the diet no larger amounts of lime salts than string beans, green peas, onions, pumpkins and sauash. Lettuce, cucumbers and celery are of no more value as sources of lime in the quantities eaten than are potatoes, their content of lime being very low. The really valuable greens, as sources of lime, are mustard greens, turnip tops, chard, cabbage greens,

endive and dandelion. Ordinary servings of three or four ounces of these greens will yield from 13 to 60 percent of the daily lime requirement, as shown in the following table.

It is clearly evident that greens are dependable sources from which lime salts may be obtained in almost any quantities desired. The small ordinary serving of 3 ounces may be easily doubled if occasion demands, as when it is necessary to replenish the depleted body stores of lime in a demineralized patient. By feeding greens twice a day and doubling the size of the serving, at the same time taking care to include in the bill of fare as many foods rich in lime as possible, one may easily increase his lime intake to three or four times the normal requirements and thus rapidly make good the deficiency in salts which is not infrequently the fundamental fault in cases of chronic diseases.

THE LIME CONTENT OF ANIMAL FOODS.

There remains for study, three subclasses of foodstuffs which are included under the general head of animal foods in Table VIII, viz, Meats, Eggs and Dairy Products. Surprising as the fact may seem, butcher's meat stands near the head of foods poorest in lime salts. Only the tomato, the apple, polished rice, cornmeal, buckwheat flour, hominy and the banana contain less lime than does average lean beef, with its content of only one-fourteenth (.07) of a grain per ounce. The explanation is found in the fact well known to physiologists, that the lime content of an animal body is almost wholly contained in the hard tissues, the bones, only one percent of the total being found in the soft parts.

Blood contains even less than flesh meats, only one-twentieth of a grain to the ounce.

It seems to the writer quite evident that the flesh of animals is not by nature designed for the food of other than carnivorous animals, if indeed it was originally designed for them. And other food essentials besides lime are lacking in the flesh of animals. The previous vitamines are present only in small and inadequate amount in animal flesh, but are found in abundance in the marrow of bones and the liver. Carnivorous animals eat the bones and the liver as well as the fat and lean tissues of the soft parts. Men, when compelled to live upon a

carnivorous diet, likewise find it necessary to eat bones, bone marrow and liver, as pointed out by Stephanson, the eminent Arctic traveler.

Fish contains a larger percentage of lime than does the flesh of warm blooded animals, nearly twice as much, in fact, but the lime content of fish is only about equal to that of white bread, which is poor in lime.

An eminent Scotch physiologist fed rats on lean meat and found that they soon showed evidence of marked deterioration. The marks of degeneracy were especially shown in the bones and the sex glands. The mammary glands degenerated and reproduction ceased. These results were doubtless due, in part at least, to a deficiency of lime.

It is interesting to note in this connection the fact that in vegetable foods the iron and lime are associated with the protein content while in flesh foods the iron is almost exclusively confined to the blood and the lime to the bones. Animal fat, like other fats, is wholly lacking in lime, hence fat meat contains less lime than does lean meat.

It is evident, then, that a high protein diet, especially a meat diet, is not indicated in conditions characterized by a deficiency of lime. Indeed, there is reason to believe that such a diet, by increasing the acid wastes of the body, may cause an undue loss of lime, and so aggravate a condition which needs to be relieved.

THE LIME CONTENT OF EGGS.

In the egg we have an embryo animal, and the first impression might naturally be that the facts pointed out in relation to flesh foods would apply equally to eggs; but this is by no means the case. It is true that the egg contains the elements which by incubation and development are evolved into an animal, but the egg contents consist of two very distinct kinds of material, the white and the yolk. The white of the egg is pure protein and is destined to become the body of the chick. It is the part which undergoes the marvelous transformations which result in the development of a fully furnished animal. It corresponds to meat, but has no structure. The yolk, on the other hand, is a specially prepared food, designed by Nature for the nourishment of the young animal while it is in the shell. Being a food product specially prepared it must contain everything essential for the development

and support of the chick until it leaves the shell.

The white of the egg, like the flesh of an animal, is not a complete food. It contains no fat, and is lacking in the essential vitamines and lime. The yolk, on the other hand, contains besides protein, a full store of all that is required for complete nutrition, lime and other salts, iron and vitamines.

A comparison of the lime content of the whole egg, the white and the yolk, as shown in Table VIII, is both interesting and instructive. As will be seen, the egg yolk contains, per ounce, nine times as much lime as the white. The figures for for the whole egg represent the combined composition of the yolk and white.

It is evident that eggs, and especially the egg yolks, are a most valuable source of food lime, but this is not true of the white taken by itself, which contains less lime per ounce than most of the cereals, scarcely more than rice, one of the poorest of all the cereals.

An egg yolk of average size weighs half an ounce and so contains a little more than 2/5 of a grain of lime (1420 grains) or 2.7 percent of a day's ration.

Egg yolk is very easily digestible. Most fats undergo digestion only after leaving the stomach and coming in contact with the bile and pancreatic juice of the small intestine. The fat of egg yolk, however, which is one third emulsified fat, quickly undergoes digestion in the stomach, as shown a few years ago by Roger of Paris.

The white of egg, on the other hand, is much less easily digestible. Eaten raw, it undergoes no digestion in the stomach and little in the small intestine; but it does undergo putrefactive changes in the colon and often interferes with the digestion of other foodstuffs. Sometimes, also, raw egg white exhibits toxic properties of a most disagreeable character. An eminent French chemist has recently demonstrated that egg poisoning is due to certain toxins sometimes present which he has studied and which he has shown are readily destroyed by the heat of cooking when the egg is cooked until well done. But hard boiled white of egg is digested very slowly and imperfectly and the fragments undergo putrefactive changes in the colon. In view of the above facts, the writer has for some years recommended in many cases the use of the yolk of the egg to the exclusion of the

of the white when the object is to increase the intake of lime salts. To insure the utilization of the lime content of eggs it is necessary that they should be properly cooked. Fried eggs and omelets are hard of digestion, and the undigested fragments which appear in the stools carry away a considerable part of the precious lime which should be retained and absorbed. This difficulty may be obviated by cooking the egg at a low temperature, 150° to 160°. Cooked in this manner, the egg is soft and jelly like or "curdled," and is presented to the stomach in most digestible form.

Thus we see that unlike meats, the yolk of egg is a choice food product especially prepared to serve as a complete and perfect nutriment.

THE LIME CONTENT OF MILK AND CHEESE.

We now come to a group of foodstuffs of unrivalled value as sources of food lime; viz, the various dairy products, every one of which, with the exception of butter is very rich in salts of lime. Pure fat, is, of course, free from lime, which is chiefly associated with the protein of caseine of the milk. But butter is not pure fat. It retains a portion of the buttermilk and so has a small lime content which is, however, too insignificant to deserve consideration in the planning of a balanced bill of fare.

Milk, in some form, is perhaps the most convenient and reliable of all sources of food lime. Whole milk contains three-quarters of a grain of lime to the ounce. This is only half the amount found in almonds and filberts; but while these nuts can be utilized only to the extent of a few ounces daily, the milk intake may be raised to several quarts.

A pint of milk contains 12 grains of food lime of finest quality and 20 ounces of whole milk will supply a whole day's ration of food lime. Skimmed milk is a little richer in lime than whole milk, a fact which ought to put an end to the very common waste of skimmed milk in connection with creameries. Considering the great lack of lime in the national dietary it is even a question whether the feeding of skimmed milk to domestic animals should not be discontinued. Growing American boys and girls need every drop of milk the country produces to give them the material which they need for bone building.

We are rapidly becoming a toothless nation because of the lack of lime in our national bill of fare. This deficiency may be easily made up by the proper utilization of our dairy products and a suitable selection of foodstuffs. Cattle and hogs can easily obtain their lime from grass and other greenstuffs, to the utilization of which their digestive organs are specially adapted, so that they can consume the large bulk necessary.

In the use of milk, man adapts to his own use the choice lime salts which the mother cow has laboriously garnered from the fields and meadows and prepared in concentrated form for the feeding of her calf. Associated with the lime in whole milk is found also a choice collection of vitamines which promote growth, so that milk not only furnishes the material needed for building and maintaining the body frame work, but supplies an activating hormone which insures the proper utilization of the building material at hand.

It is interesting to note that a tablespoonful of milk supplies nearly the same amount of lime as an egg yolk and a little more than half a pint of skimmed milk (9 ounces) supplies as much lime or bone building material, as a dozen eggs.

While skimmed milk contains more lime than whole milk the vitamine content is somewhat less, a portion being held in solution by the butter fat which has been removed. But the chief values of milk are left after the fat has been removed, and the great economic waste and physiologic damage which have resulted from the past failure to utilize this by-product of our great dairy industry, should be stopped as speedily as possible.

Buttermilk has a lime value almost equal to that of whole and skimmed milk, a pint and a half affording a full day's supply of lime. Sour milk commonly sold as buttermilk, and under various trade names as "Bulgarian Buttermilk," is fermented or soured skimmed milk and hence has the same lime content as skimmed milk.

Cream is not by any means the equivalent of milk as a source of lime. An ounce of cream contains only two-thirds as much lime as the same quantity of whole milk. Nearly a quart of cream is necessary to supply a day's ration of lime on account of the larger amount of fat present.

But it is in cottage cheese that we find the richest and readiest means of increasing our lime intake. Milk solids constitute only about one-eighth of its bulk and weight. Consequently, the elimination of the greater part of the water in the process of cheese making results in a great concentration of the lime content. Ordinary cheese has a lime content of 5.7 grains per ounce, or eight times the amount in whole milk, more than any other foodstuff. An ounce of average cheese supplies as much lime as seven yolks or five entire eggs, or 5 pounds of beefsteak, or half a peck of potatoes.

But cheese is not easily digested by many persons. The butryic acid which it contains in considerable amount when old and strong, excites the gastric gland to secrete an excess of hydrochloric acid, and so gives rise to heart burn, a common symptom following the free eating of cheese. There are in old cheese various more or less toxic products the result of the activities of the numerous molds, yeasts and germs which co-operate in the production of cheese, to say nothing of the "mites" "skippers" (maggots) and other scavengers which are usually found in "ripe" specimens of cheese.

In view of these discouraging facts, it is pleasant to find that in the simple cottage cheese which the farmer's wife prepares on short notice in her own kitchen from the well skimmed sour milk of her "milk house," possesses all the good qualities of ordinary cheese while free from all its objectionable features. The only inconvenience is that it must be freshly prepared unless kept in an ice box.

Cottage cheese supplies 41/5 grains of lime (4.18 grs.) per ounce, and hence 3 3/4 ounces cheese will furnish a day's lime ration.

"Yogurt Cheese", a cream cheese prepared by a process modified by the writer from that employed in making the famous Cammembert cheese, omitting the green mold and using pure cultures of the Bulgarian bacillus, has all the advantages of cottage cheese and will keep for months with some care to keep cool. This dainty product is a complete satisfactory substitute for ordinary cheese for all but those who have developed a connoisseur's appetite for the putrescent aromas of limburger and gorganzola.

Even whey a by-product of cheese making, which usually goes down the sewer, possesses no mean value as a source of nutritive lime salts. There are in the whole category of foodstuffs few, in fact, which are so rich in lime as is whey, which contains more than 1/4 grain to the ounce. The lime content of whey is greater than that of any cereal, three times as great as that of egg whites, and four times as much as that of cornmeal, or rice. A large glassful of whey contains as much food lime as two pounds of beefsteak and a pint is equal in lime content to two-thirds of a dozen eggs. Three pints a day, taken as a beverage in place of beer, for example, would supply nearly a day's lime ration, as much as would be furnished by a fifty gallon cask of beer. If the saloons about to be vacated as distributing stations for the breweries were converted into "whey stations" the result would be an enormous economic gain, not only in the utilization of a valuable nutrient which is wasted, but in the conservation of the health and a great increase in the productive power of great masses of the population.

THE LIME CONTENT OF SPECIAL FOOD PREPARATIONS (HEALTH FOODS)

Of these special products the most notable is wheat gluten which contains more than a grain of lime to the ounce. It is still richer relatively, in iron. This is due to the fact that the lime and iron compounds of vegetable foods are associated with the protein rather than the starch or fat constitutents. A single ounce of gluten contains one-fifteenth of a day's ration of lime. Forty per cent gluten contains two-fifths as much and twenty percent, one-fifth.

Brose, a mixture of oatmeal and sterilized bran, supplies three percent of a days lime ration in one ounce, which is double the amount found in graham flour.

Protose and Malted Nuts each furnish more than two-fifths of a grain of lime to the ounce, or about seven times as much as does lean meat, such as tenderloin.

Nuttolene, a pine nut product, contains more than twice as much lime as fine flour, and four times as much as Porterhouse steak.

Malt sugar contains as much lime as does barley or rye, and more than any other cereal, while cane sugar contains no lime at all and honey less than one-tenth as much.

And now our survey of the lime values of our common foodstuffs will be brought to a close, although it might be somewhat further extended. The writer hopes that he has at least succeeded in awakening an interest in this one of the most important and practical of problems in dietetics, and in showing how the facts which have been patiently wrought out in scientific laboratories by long years of toilsome effort, may be readily applied in the practical dietetics of the home, the hospital, the army cantonment and the construction camp.

In conclusion, let us see how easily the bill of fare for every day and every meal may be so enriched in lime salts that there can be no possible lack. A few nuts, a handful of greens, a pint of milk, a bit of cheese, an ounce of bran, and the the thing is done. Let us figure it out in percent of daily needs and see what the result will be. (See Tables I Column 2).

1½ ounces of almonds	14
4 ounces chard	24
6 ounces milk	29
6 ounces buttermilk	25
1 ounce cottage cheese	27
1 ounce bran	5
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A full day's lime ration and an overplus of 24 percent. Evidently we have been starving in the midst of plenty. Let us return to sane and biologic living. Our salvation from malnutrition is not to be found in beefsteaks and chops as the doctors have been telling us for a century, but in milk and greens, the ambrosia of the gods, with a little bran thrown in as penance for the sins of out youth and those of our forbeats.

The Arab escapes the penalties of a monotonous diet of wheat by adding date and camel's milk. In half a pound of dates he absorbs one-fifth of a lime ration and supplements this with a pint of camel's milk or a couple ounces of camel's milk cheese which furnish him with more than a half ration of lime and furnish an adequate supplement for the lime content of his 20 ounce ration of boiled wheat.

One hot day in April the writer stood at the foot of the great pyramid of Cheops almost gasping for breath after a laborious forty minutes' climb to the top and back again with the help of two atheletic young Arabs reared on wheat, dates and camel's milk who had pulled and boosted him up the precipitious sides of the huge tombstone. Drawing a long breath, one of the young men said, "Give me four shillings, ($1.00) and I will climb old Cheops and get back in ten minutes; give me six shillings, and I will make it in eight minutes: or, eight shillings and I will do it in six minutes." Not wishing to see the young man kill himself by such violent exertion in the weltering heat of an Egyptian sun, and doubting his ability to come anywhere near accomplishing such an impossible feat, I showed him a four shilling piece. Away he shot, like an arrow, leaping up the great stone steps (about four feet high) like an antelope. In five minutes he was at the top, and then he came dashing down in a headlong fashion that made me shudder. He was back in just 7½ minutes.

The mountaineers of the Balkans, whose chief diet is boolgour (wheat boiled and dried then cooked with a fat of some sort) finds in the milk obtained from the hardy sheep, which he shepherds on the sweet grasses of his mountain pastures, a perfect protection against lime starvation. Half a pint of this very rich milk and a bit of sheep's milk cheese amply safeguard his lime requirement.

The writer, many years ago, when traveling on the Mediterranean, watched with much interest a group of Greek sailors reclining on the deck and making their midday meal of rye bread (pumpernickel), figs and ripe olives. A pound and a half of bread, half a pound of figs and a quarter of a pound of olives, with a bit of dried cheese, made a liberal and well balanced ration, supplying the full lime requirement with 30 or 40 percent to spare, and all the other good things needed to furnish them complete biologic diet, the good effects of which were evident in their stalwart forms and the magnificent exhibition of energy and strength and endurance which they constantly displayed in their work.

It is interesting to note that the dietetic instinct of various primitive tribes has led them to add milk to foods containing very little lime, thus rendering complete a dietary otherwise so deficient in lime as to be incapable of sustaining life for any considerable period of time. For example the Jakuts of Northern Siberia who subsist almost wholly upon the boiled flesh of horses and cattle, add to this one sided and deficient diet liberal quantities of milk of cows and mares which they eat in the form of sour curd. They also prepare "Jakut butter" a sort of cream cheese.

The Kaffir eats large quantities of sour milk-curd, which, together with millet and "Malies", a coarse cornmeal, constitutes their whole bill of fare. The milk supplies the lime which the corn lacks. One large meal of this simple food, eaten in the evening, suffices to produce and maintain the remarkable fine p. physical development for which the Kaffir race is known through the world.

In Caesar's time the Celts lived almost exclusively on pork, supplemented by milk.

Among the ancients, milk was little used as a beverage in its natural state, but was made into a sort of cheese, often referred to as butter in the Bible and other ancient writings.

The milk of many different species of animals was used by the ancients, including that of the dog, now seldom employed. At the present time, the milk of the cow and goat are practically the sole sources of milk in America. In some parts of Europe the milk of sheep and of the ass is used also. The milk of the reindeer is used in Lapland and Alaska , of the Yak in Tibet, of the mare in Tartary and to some extent in Russia, of the buffalo in Africa and of the camel in Arabia and Persia and of the vicuna and the llama in South America. In certain parts of Africa, according to Bigelow, the milk of negresses in sometimes provided for the sick.

THE LIME CONTENT OF FOODSTUFFS

The following table shows in column (1) the amount of lime (grains) contained in one ounce. Column (2) shows the percent of one day's lime ration in one ounce. Column (3) shows the amount of the foodstuff required to supply 15.4 grains of lime (CaO) the amount required for one day. Column (4) shows the percent of one day's requirement of lime found in 100 calories. Column (5) shows the weight of one hundred calories (ounces). Column (6) is the weight of an ordinary serving. Column (7) gives the number of calories in an ordinary serving.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Almonds	1.464	9.5	10.5	5.2	.5	.5	100
Apples	.043	.3	358.0	1.6	5.3	5.3	100
Apples, dried	.196	1.3	78.5	1.6	1.2	1.2	100
Apple juice	.049	.5	314.3	1.6	6.0	6.0	100
Apricots	.086	.6	180.0	3.3	6.1	3.0	50
Apricots, dry	.404	2.6	38.0	3.3	1.1		
Asparagus	.153	1.0	100.6	17.1	15.7	1.7	10
Bananas	.055	.4	280.0	1.2	3.5	3.5	100
Barley, entire	1263	1.7	58.5	3.0	1.7		
Barley, pearled	.122	.8	126.2	1.1	1.0	(3.5)	100
Beans, dried	.980	6.4	15.7	6.5	1.0	(3.2)	125
Beans, lima, dry	.435	2.8	35.4	2.8	1.0	(2.3)	100
Beans, Lima, Fresh	.171	1.1	90.0	2.8	2.9	3.0	100
Beans soya	2.000	13.0	7.7	11.2	.86	.86	100
Beans, string, fresh	.282	1.8	54.6	13.0	17.0	4.0	25
Beef, tenderloin	.057	.4	270.0	.45	1.29	2.5	200
Beets	.178	1.2	86.5	8.9	7.6	(2.2)	25
Blackberries	.104	.7	150.0	4.2	5.9	3.0	50
Blueberries	.122	.8	126.2	3.8	4.7	2.2	50
Blood	.049	.3					

Bran, Wheat	.735	4.8	21.0	5.7	1.2	.5	43
Bread, Boston Brown	.790	5.1	19.5	7.9	1.2	1.2	100
Bread, entire wheat	.133	.9	116.0	1.23	11.44	2.0	150
Bread, graham	.176	1.2	90.0	1.60	1.34	2.0	150
Bread, rye	.147	1.0	105.0	1.3	1.4	2.0	150
Bread, entire rye (pumpernickel)	.259	1.7	60.0	2.8	1.7	2.0	120
Bread, white	.091	.6	170.0	.8	1.3	2.0	150
Bread, fruit	.514	3.3	30.0				
Brussels Sprouts	.165	1.1	93.3	12.1	11.3	4.0	
Buckwheat flour	.239	1.6	64.4	5.9	1.0		
Butter	.092	.6	167.4	.3	.46	.5	113
Buttermilk	.643	4.2	24.0	41.1	10.0	6.1	75
Buttermilk Yogurt	.747	4.8	20.6	56.3	9.6	6.5	75
Cabbage	.276	1.8	56.0	20.0	11.1	4.0	25
Cabbage greens	.649	4.2	23.7	47.3	11.0	4.0	25
Cantaloupe	.104	.7	150.0	6.1	9.0	7.0	75
Carrots	.343	2.2	44.9	33.3	7.3	3.7	50
Cauliflower	.753	4.9	20.4	56.4	11.0	3.0	25
Celery	.478	3.1	32.2	58.9	18.0	1.0	6
Chard	.919	6.0	16.7	55.0	8.7	3.0	35
Cheese	5.702	37.0	2.7	29.7	.77	.5	70
Cheese, cottage	4.180	27.1	3.7	85.2	3.2	2.0	75
Cheese, Yogurt	4.285	27.8	3.6	26.0	.93	.5	50
Cherries	.116	.8	133.0	3.5	4.7	2.2	50
Cherry juice	.104	.7	150.0	3.1	4.6	4.6	100
Chestnuts	.208	1.3	75.0	1.9	1.4	1.5	100
Chicken, broiler	.066	.43	235.0	1.4	3.25	2.5	75
Coconut, dry	.361	2.3	42.6	.9	.6		
Coconut, fresh	.147	1.0	105.0	.9	.9	2.0	225
Corn, whole	.122	.8	126.2	.8	1.0	1.0	100

Cornmeal	.110	.7	140.0	.7	1.0	(4.5)	75
Corn, Sweet, fresh	.037	.2	426.0	.8	3.5	(2.7)	75
Corn, sweet, dry	.129	.8	114.4	.8	1.0		
Cow Peas	.612	4.0	25.1	4.1	1.0		
Cottonseed meal	1.623	10.5	9.5	9.2	.9		
Crackers	.135	.9	114.0	.8	.9	1.0	110
Cranberries	.110	.7	140.0	4.4	7.5	3.0	40
Cream	.527	3.42	29.2	7.2	1.75	2.2	125
Cucumbers	.098	.6	157.0	12.6	20.0	2.0	10
Currants, fresh	.159	1.0	96.8	6.3	6.1	3.0	50
Currants, dry, Zante	.502	3.3	30.7	3.6	1.1	1.5	140
Dandelion greens,	.643	4.2	24.0	24.1	5.5	3.0	
Dates	.398	2.6	38.6	2.6	1.0	1.0	100
Egg Plant	.067	.4	230.0	5.7	12.2	1.5	10
Eggs	.450	2.9	34.2	6.3	2.4	1.9	80
Egg, one(1.8 oz)	.810	5.2	19.0			1.08	80
Egg white	.092	.6	167.4	2.8	4.7	1.0	14
Egg white of one (1.2 oz)	.116	.7	140.0			1.2	17
Egg yolk one egg	.839	5.4	18.3	5.0	.9	1.0	100
Egg yolk (.6 oz.)	.503	3.3	30.6			.6	60
Endive	.637	4.1	24.0	45.5	11.0	(3.0)	25
Farina	.129	.8	119.4	.8	1.0		
Figs, dry	.992	6.4	15.6	7.2	1.1	2.0	180
Figs, fresh	.325	2.1	47.4	7.2	3.4	2.0	70
Fish	.134	8.7	114.6	2.6	3.0	6.0	200
Flour, buckwheat	.061	.5	252.5	1.5	1.0		
Flour, entire wheat	.190	1.2	81.0	1.2	1.0		
Flour, graham	.239	1.6	64.4	1.5	1.0		
Flour, white	.122	.8	136.2	.8	1.0		
Flour, rye	.110	.7	140.0	.7	1.0		
Flour, rye entire	.293	1.9	52.5	2.5	1.3		

Gluten Pure	1.025	6.6	15.0	6.6	1.0	.5	50
Gluten 40%	.400	2.6	38.0	2.6	1.0	1.0	100
Gluten 20%	.200	1.3	76.0	1.3	1.0	1.0	100
Gooseberries	.214	1.4	72.0			2.5	
Grapefruit	.129	.8	119.4	5.6	6.7	3.5	50
Grapes	.115	.7	133.0	2.7	3.6	3.5.	100
Grapejuice	.067	.4	230.0	1.5	4.0	4.0	100
Guava	.086	.6	180.0				
Hazelnuts (filberts)	1.758	11.4	8.8	5.7	.5	.5	100
Hominy	.067	.4	230.0	.2	1.1	1.6	150
Honey	.024	.2	268.6	.2	1.1	1.6	150
Kohl-rabi	.472	.3	32.6	34.9	11.5	(10)	35
Lemon juice	.147	1.0	105.0	8.4	8.9	.5	5
Lentils, dry	.655	4.3	23.5	4.3	1.1	(3.0)	100
Lettuce	.263	1.7	58.5	31.4	18.4	1.0	5
Linseed meal	2.530	16.4	6.1				
Maple syrup	.655	4.3	23.5	5.3	1.3	1.2	100
Macaroni	.135	.9	114.0	.8	1.0	(3.0)	100
Mango	.129	.8					
Milk, whole	.735	4.8	21.0	24.3	5.1	6.0	125
Milk, skimmed	.747	4.8	20.6	46.3	9.6	6.5	75
Milk, condensed, sweetened	1.837	11.9	8.4	15.3	1.1	2.0	180
Milk, human	.208	1.4	70.0	7.0	4.75	5.0	100
Milk, camels	.876	5.7	17.5				
Milk, goats	.784	5.1	20.0				
Milk, sheeps	1.266	8.2	12.2				
Molasses	1.292	8.4	12.0	10.2	1.2	1.2	100
Mushrooms	.104	.7	150.0				
Millet	.086	.5	180.0				
Muskmelon	.104	.7	150.0	6.0	8.8	7.0	75

Mustard Greens	3.013	19.6	5.1			3.0	
Oatmeal	.423	2.7	36.4	2.4	.9	(4.2)	75
Okra	.435	2.8	35.4	2.4	9.3	(4.5)	50
Olives	.747	4.9	20.6	5.7	1.2	1.2	100
Onions	.208	1.3	75.0	9.7	7.2	(2.5)	35
Oranges	.276	1.8	55.7	12.3	6.8	5.0	75
Orange Juice	.178	1.2	86.5	9.3	8.0	6.0	75
Paprika	1.401	9.1	11.0				
Parsnips	.361	2.3	42.7	12.8	5.4	(3.0)	55
Peaches	.098	.6	157.1	5.3	8.1	4.1	50
Peaches, dry	.208	1.4	75.0	5.3	4.0	2.0	50
Pears	.092	.6	167.4	3.3	5.5	4.0	75
Pear juice	.055	.4	280.0	1.4	3.9	6.0	150
Peas, dry	.514	3.3	30.0	3.6	1.0	(3.0)	100
Peas, green	.171	1.1	90.0	4.0	3.5	3.5	100
Peanuts	.435	2.8	35.4	1.8	.6	.6	100
Pecan nuts	.545	3.5	28.2	1.7	.5	.5	100
Persimmons	.135	.9	114.0				
Pineapple	.110	.7	140.0	5.8	8.1	4.0	50
Plums	.122	.8	126.2	3.3	4.1	4.1	100
Potatoes	.086	.5	180.0	2.5	4.2	(3.0)	75
Potatoes, sweet	.116	.7	133.0	2.3	2.8	(3.5)	200
Prunes, dried	.331	2.2	46.5	2.5	1.2	(3.7)	100
Pumpkin	.141	.9	109.2	12.5	13.6	(3.5)	25
Radishes	.129	.8	119.4	10.2	11.9	1.0	6
Raisins	.392	2.5	39.3	2.8	1.0	1.0	100
Raspberries	.300	2.0	52.3	10.4	5.3	4.1	75
Raspberry juice	.129	.8	119.4	3.0	3.4	5.0	150
Rice, polished	.055	.3	280.0	.3	1.0	(4.0)	125
Rice, brown	.073	.5	211.0			3.0	

Romaine	.276	1.8	57.0				
Rutabagas	.453	2.9	34.0	25.9	8.8	(4.0)	25
Rye, entire	.337	2.2	45.7	3.0	1.3		
Spinach	.410	2.7	33.6	39.3	15.0	(3.0)	20
Squash	.116	.7	133.0	5.5	7.6	(3.7)	50
Strawberries	.251	1.6	61.3	14.6	9.4	4.7	50
Tapioca	.141	.9	109.2	.6	1.0	1.0	100
Tomatoes	.067	.4	230.0	7.0	15.3	4.0	25
Tomato juice	.037	.2	416.0				
Turnips	.392	2.5	39.3	22.6	9.0	(4.5)	50
Turnip tops	2.125	13.8	7.2			3.0	
Walnuts	.545	3.5	28.3	1.8	[illegible]	.5	100
Watercress	1.153	7.5	13.4	135.0	18.0	1.5	10
Watermelon	.067	.4	230.0	5.3	11.6	8.0	75
Wheat, entire	.276	1.8	56.0	1.8	1.0	(5.7)	150
Wheat, bran	.735	4.8	21.0	5.7	1.2	.5	43
Wheat, germ	.435	2.8	35.4	2.8	1.0	1.0	100
Whey	.269	1.9	57.2	22.7	13.0	7.0	50

Lime- TABLE I addendum

THE LIME CONTENT OF HEALTH FOODS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Protose	.416	2.7	37.0	5.4	2.0	200	100
Nuttolene	.263	1.7	58.5	3.4	2.0	2.0	100
Gluten, pure	.498	3.1	32.2	3.1	1.0	.5	50
Gluten, 40%	.191	1.2	80.0	1.2	1.0	1.0	100
Gluten, 20%	.095	.6	160.0	.6	1.0	1.0	100
Meltose (Malt Honey)	.122	.8	126.2	1.5	1.2	2.4	200
Savora	1.207						
Brose (oatmeal and bran)	.485	3.1	32.0	3.0	1.0	1.0	100
Malt sugar	.262	1.7	60.0	1.7	1.0	2.0	200
Malted Nuts	.433	2.3	35.5	1.9	.7	1.3	200
Nut Soup Stock	.171						

Lime - TABLE 1 a

FOODS RICH IN LIME SALTS

The following table of foods which are richest in lime salts shows in column (1) the amount of lime (CaO) in one ounce. (2) the percentage of the lime ration (15.4) grains) found in one ounce. (3) the amount required to supply the lime ration, 1 gram (15.4 grains) for one day. (4) The percentage of the lime ratio found in 100 calories. (5) Weight of 100 calories (ounces). (6) Weight of an ordinary serving (ounces). (7) The number of calories in an ordinary serving.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Almonds	1.464	9.5	10.5	5.2	.5	.5	100
Beans, dry	.980	6.4	15.7	6.5	1.0	(3.2)	125
Beans, soya	2.000	13.0	7.7	11.2	.86	1.7	200
Bread, Boston brown	.790	5.1	19.5	7.9	1.2	1.2	100
Brose	.485	3.1	32.0	3.0	1.0	1.0	100
Buttermilk	.645	4.2	24.0	41.1	10.0	6.0	60
Cabbage greens	.649	1.0	23.7	47.3	11.0	4.0	25
Cauliflower	.753	4.0	20.4	56.4	11.0	3.0	25
Celery	.478	3.0	32.2	58.9	18.0	1.0	6
Chard	.919	6.0	16.7	55.0	8.7	3.0	35
Cheese	5.702	37.0	2.7	29.7	.77	.5	70
Cheese, cottage	4.180	27.1	3.7	85.2	3.2	2.0	75
Cheese, yogurt	4.285	27.8	3.0	26.0	.93	.5	50
Cow peas	.612	4.0	25.1	4.1	1.0		
Cottonseed meal	1.623	10.5	9.5	9.2	.9		
Currants, dry, Zante	.502	3.3	30.7	3.6	1.1	1.5	140
Dandelion greens	.643	4.2	24.0	24.1	5.5	3.0	60
Dates	.400	2.6	38.6	2.6	1.0	1.0	100
Eggs	.450	2.9	3.2	6.3	2.4	1.3	70
Egg Yolk	.839	5.4	18.3	5.0	.9	1.0	110
Endive	.637	4.1	24.0	45.5	11.0	3.0	25
Figs, dry	.992	6.4	15.5	7.2	1.1	2.0	100
Gluten pure	1 .025	6.6	15.0	6.6	1.0	.5	50
Gluten 40%, ...	.400	2.6	38.0	2.6	1.0	1.0	100

Hazelnuts (filberts)	1.758	11.4	8.8	5.7	.5	.5	100
Kohl-rabi	.472	3.0	32.6	34.9	11.5	4.0	35
Lentils, dry	.655	4.3	23.5	4.3	1.1	(3.0)	100
Linseed meal	2.530	16.4	6.1				
Maple syrup	.655	4.3	23.5	5.3	1.3	1.3	100
Milk, skimmed	.747	4.8	20.6	46.3	9.6	6.5	75
Milk, whole	.735	4.8	21.0	34.3	5.1	6.0	125
Milk, condensed, sweetened	1.837	11.9	8.4	15.3	1.1	2.0	100
Molasses	1.292	8.4	12.0	10.2	1.2	1.2	100
Mustard greens	3.013	19.6	5.1			3.0	
Oatmeal	.423	3.7	36.4	2.4	.9	(4.2)	75
Okra	.435	2.8	35.4	2.4	9.3	4.5	50
Olives	.747	4.9	20.6	5.7	1.2	1.2	100
Paprika	1.401	9.1	11.0			1.0	
Peas, dry	.514	3.3	30.0	3.6	1.0	3.0	100
Peanuts	.435	2.8	35.4	1.8	.6	.6	100
Pecan nuts	.545	3.5	28.2	1.7	.5	.5	100
Protose	.416	2.7	37.0	5.4	2.0	2.0	100
Raisins	.392	2.5	39.3	2.8	1.0	1.0	100
Rutabagas	.435		34.0	25.9	8.8	(4.0)	25
Spinach	.410	2.7	33.6	39.3	15.0	(3.0)	20
Turnips	.392	2.5	39.3	22.6	9.0	(4.5)	50
Turnip tops	2.125	13.8	7.2			3.0	
Walnuts	.545	3.5	28.3	1.8	.5	.5	100
Watercress	1.153	7.5	13.4	135.0	18.0	1.5	10
Wheat, bran	.735	4.7	21.0				
Wheat, germ	.435	2.8	35.4	2.8	1.0	1.0	100
Whey	.269	1.0	57.2	22.7	13.0	7.0	50

THE LIME CONTENT OF FRUITS

The following table shows the lime content of uncooked fruits. Column (1) gives the amount of lime found in one ounce. Column (2) shows the percentage of the lime ration (15.4 grains) found in one ounce. Column (4) shows the percentage of the lime ration found in 100 calories. Column (7) gives the number of calories in an ordinary serving. (See Battle Creek Sanitarium Diet List.)

	(1)	(2)	(4)	(7)
Apples	.043	.3	1.6	100
Apples, dried	.196	1.3	1.6	100
Apple juice	.049	.5	1.6	100
Apricots	.086	.6	3.3	50
Apricots, dry	.404	2.6	3.3	
Bananas	.055	.4	1.2	100
Blackberries	.104	.7	4.2	50
Blueberries	.122	.8	3.8	50
Breadfruit	.514	3.3		
Cantaloupe	.104	.7	6.1	75
Cherries	.116	.8	3.5	50
Cherry juice	.104	.7	3.1	100
Cranberries	.110	.7	5.4	40
Currants, fresh	.159	1.0	6.3	50
Currants, dry, Zante	.502	3.3	3.6	140
Dates	.398	2.6	2.6	100
Figs, dry	.992	6.7	7.2	180
Figs, fresh	.325	2.1	7.2	70
Gooseberries	.214	1.4		
Grapefruit	.129	.8	5.6	50
Grapes	.115	.7	2.7	100
Grape juice	.067	.4	1.5	100
Guava	.086	.6		
Lemon juice	.147	1.0	8.4	5

	(1)	(2)	(4)	(7)
Mango	.129	.8		
Muskmelon	.104	.7	6.0	75
Olives	.747	4.9	5.7	100
Oranges	.276	1.8	12.0	75
Orange juice	.178	1.2	9.3	75
Peaches	.098	.6	5.3	50
Peaches, dry	.208	1.4	5.3	50
Pears	.092	.6	3.3	75
Pear juice	.055	.4	1.4	150
Persimmons	.135	.9		
Pineapple	.110	.7	5.8	50
Plums	.122	.8	3.3	100
Prunes, dry	.331	2.2	2.5	100
Raisins	.392	2.5	2.8	100
Raspberries	.300	2.0	10.4	75
Raspberry juice	.129	.8	3.0	150
Strawberries	.251	1.6	14.6	50
Tomatoes	.067	.4	7.0	25
Tomato juice	.037	.2		
Watermelon	.067	.4	5.3	75

Lime - TABLE 11a

FRUITS WHICH HAVE THE LARGEST LIME CONTENT

	(1)	(2)	(4)	(7)
Currants, dry Zante	.502	3.3	3.6	140
Dates	.400	2.6	2.6	100
Figs, dry	1.000	6.4	7.2	180
Olives	.750	4.9	5.7	100
Oranges	.276	1.8	12.0	75
Prunes	.231	2.2	2.5	100
Raisins	.392	2.5	2.8	100
Raspberries	.300	2.0	10.4	75
Strawberries	.250	1.6	14.6	50

Lime - Table 111

THE LIME CONTENT OF NUTS

The following table shows the lime content of nuts. Column (1) gives the amount of lime found in one ounce. Column (2) shows the percentage of the lime ration (15.4 grains) found in one ounce. Column (4) shows the percentage of the lime ration found in 100 calories. Column (7) gives the number of calories in an ordinary serving.

	(1)	(2)	(4)	(7)
Almonds	1.464	9.5	5.2	100
Chestnuts	.208	1.3	1.9	100
Cocoanut, dried	.361	2.3	.9	
Hazelnuts (filberts)	1.758	11.4	5.7	100
Peanuts	.435	2.4	1.8	100
Pecan nuts	.545	3.5	1.7	100
Walnuts	.545	3.5	1.8	100

Lime - TABLE IV.

THE LIME CONTENT OF CEREALS AND BREADS

The following table shows in column (1) the amount of lime found in one ounce. Column (2) gives the percentage of the lime ration (15.4 grains) in one ounce. Column (4) gives the percentage of the lime ration found in 100 calories. Column (7) shows the number of calories in an ordinary serving. (See Battle Creek Sanitarium Diet List)

	(1)	(2)	(4)	(7)
Barley, entire	.263	1.7	3.0	
Barley, pearled	.122	.8	1.1	100
Bread, Boston Brown	.790	5.1	7.9	100
Bread, entire wheat	.133	.9	1.23	150
Bread, graham	.176	1.2	1.6	150
Bread, rye	.147	1.0	1.3	150
Bread, entire rye (pumpernickel)	.259	1.7	2.8	120
Bread, white	.091	.6	.8	150
Buckwheat flour	.239	1.6	5.9	
Corn, whole	.122	.8	.8	100
Cornmeal	.110	.7	.7	75
Cottonseed meal	1.623	10.5	9.2	
Crackers	.135	.9	.8	110
Farina	.129	.8	.8	
Flour, buckwheat	.061	.4	1.5	
Flour, entire wheat,	.190	1.2	1.2	
Flour, graham	.239	1.6	1.5	
Flour, white	.123	.8	.8	
Flour, rye	.110	.7	.7	
Flour, rye entire	.293	1.9	2.5	
Hominy	.067	.4	.2	100
Linseed meal	2.530	16.4		
Macaroni	.135	.9	.8	100
Millet	.086	.5		
Oatmeal	.423	2.7	2.4	75

Rice, polished	.055	.3	.3	125
Rice, brown	.073	.5	.4	100
Rye, entire	.337	2.2	3.0	
Tapioca	.141	.9	.6	100
Wheat, entire	.276	1.8	1.8	
Wheat, bran	.735	4.7		
Wheat, germ	.435	2.8	2.8	100

Lime - TABLE V.

THE LIME CONTENT OF VEGETABLES

The following table shows in column (1) the amount of lime found in one ounce. Column (2) shows the percentage of the lime ration (15.4 grains) found in one ounce. Column (4) gives the percentage of the lime ration found in 100 calories. Column (7) shows the number of calories in an ordinary serving. (See Battle Creek Sanitarium Diet List).

	(1)	(2)	(4)	(7)
Asparagus				
Beans, lima, fresh	.171	1.1	2.8	100
Beans, string, fresh	.282	1.8	13.0	25
Beets	.178	1.2	3.9	25
Brussels sprouts	.165	1.1	12.1	
Cabbage	.276	1.8	20.0	25
Carrots	.342	2.2	33.3	50
Cauliflower	.753	4.0	56.4	25
Corn, sweet, fresh	.037	.2	.8	75
Cucumbers	.098	.6	12.6	10
Eggplant	.067	.4	5.7	10
Kohl-rabi	.472	3.0	34.9	35
Mushrooms	.104			
Okra	.435	2.8	2.4	50
Onions	.208	1.3	9.7	35
Parsnips	.361	2.3	12.8	55
Potatoes	.036	.5	2.5	75
Potatoes, sweet	.116	.7	2.3	200
Pumpkin	.141	.9	12.5	25
Radishes	.129	.8	12.2	6
Rutabagas	.453	2.9	25.9	25
Squash	.116	.7	5.5	50
Turnips	.392	2.5	22.6	50

Lime - TABLE VI

THE LIME CONTENT OF LEGUMES

The following table shows in column (1) the amount of lime found in one ounce. Column (2) gives the percentage of the lime ration (15.4 grains) found in one ounce. Column (4) shows the percentage of the lime ration in 100 calories. Column (7) gives the number of calories in an ordinary serving. (See Battle Creek Sanitarium List).

	(1)	(2)	(4)	(7)
Beans, dry	.980	6.4	6.5	125
Beans, lima dry	.435	2.8	2.8	100
Beans, Soya				
Cow peas	.612	4.0	4.1	
Cottonseed meal	1.623	10.5	9.2	
Lentils, dry	.655	4.3	4.3	100
Linseed Meal	2.530	16.4		
Peas, dry	.612	3.3	3.6	100
Peas, green	.171	1.1	4.0	100

Lime - TABLE VII

THE LIME CONTENT OF GREENS

The following table shows in column (1) the amount of lime found in one ounce. Column (2) gives the percentage of the lime ration found in one ounce. Column (4) gives the percentage of the lime ration found in 100 calories. Column (7) shows the number of calories in an ordinary serving. (See Battle Creek Sanitarium Diet List).

	(1)	(2)	(4)	(7)
Asparagus	.153	1.0	17.1	10
Celery	.478	3.1	58.9	6
Chard	.919	6.0	55.0	35
Dandelion greens	.643	4.2	24.1	
Endive	.367	4.1	45.5	25
Lettuce	.263	1.7	31.4	5
Mustard greens	3.013	19.6		
Paprika	1.401	9.1		
Romaine	.276	1.8		
Spinach	.410	2.7	39.3	20
Turnip tops	2.125	13.8		
Watercress	1.153	7.5	135.0	10

Lime - TABLE VIII

THE LIME CONTENT OF ANIMAL FOODS

The following table shows in column (1) the amount of lime found in one ounce. Column (2) gives the percentage of the lime ration (15.4 grains) in one ounce. Column (4) shows the percentage of the lime ration found in 100 calories. Column (7) gives the number of calories in an ordinary serving. (See Battle Creek Sanitarium Diet List.)

	(1)	(2)	(4)	(7)
Dairy Products				
Milk, whole	.735	4.8	24.3	125
Milk, skimmed	.747	4.8	46.3	75
Milk, condensed, sweetened	1.837	11.9	15.3	180
Buttermilk	.643	4.2	41.1	75
Cheese	5.702	37.0	29.7	70
Cheese, cottage	4.180	27.1	21.2	75
Cheese, yogurt	4.285	27.8	26.0	50
Cream	.527	3.42	7.2	125
Butter	.092	.6	.3	113
Whey	.269	1.0	22.7	50
Milk, human	.208	1.4	7.0	100
Eggs				
Eggs	.450	2.9	6.3	60
Eggyolk	.839	5.4	5.0	110
Egg white	.092	.6	2.8	20
Meats				
Beef, tenderloin	.057	.4	.45	200
Chicken, broilers	.066	.43	1.4	75
Fish	.134	8.7	2.6	200
Blood	.049	.32		

Lime and Iron TABLE IX

FOODS RICH IN IRON AND LIME

The following table shows the amount of lime and iron per ounce (1). The percentage of the day's ration of iron and of lime in one ounce (2). The percentage of the iron ration and the lime ration in 100 calories (4). The number of calories in an ordinary serving.(7)

	(1)		(2)		(4)		(7)
	Iron	Lime	Iron	Lime	Iron	Lime	
Almonds	.0171	1.464	7.3	9.5	4.0	5.2	100
Beans, dry	.0306	.980	13.8	6.4	13.5	6.5	125
Beans, soya	.0248	2.000	10.7	13.0	9.2	11.2	100
Bread, Boston Brown	.0131	.790	5.6	5.1	9.0	7.9	100
Cabbage greens	.0079	.649	3.4	4.2	30.0	47.3	25
Chard	.0100	.919	4.7	6.0	44.0	55.0	35
Currants, dry zante	.0109	.502	4.7	3.3	6.0	3.6	140
Dandelion greens	.0113	.643	5.1	4.2	30.0	24.1	50
Dates	.0131	.398	5.7	2.6	6.0	2.6	100
Eggs	.0131	.450	5.7	2.9	14.0	6.3	70
Eggyolk	.0277	.839	16.3	5.4	15.3	5.0	110
Endive	(.0106)	.637	4.6	4.1	50.5	45.5	25
Figs, dry	.0131	.992	5.7	6.4	6.3	7.[illegible]	180
Hazelnut	.0179	1.758	7.75	11.4	4.0	5.7	100
Lentils, dry	.0277	.655	16.3	4.3	19.5	4.3	100
Mustard greens	(.0213)	3.013	9.2	19.6			
Oatmeal	.0166	.423	7.2	2.7	6.4	2.4	75
Olives	.0127	.747	6.5	4.9	6.5	5.7	100
Peas, dry	.0249	.514	10.8	3.3	11.0	3.6	100
Pecan nuts	.0114	.545	4.9	3.5	2.3	1.7	100
Raisins	.0092	.392	4.0	2.[illegible]	9.[illegible]	2.6	100
Spinach	.0158	.410	6.8	2.7	100.4	38.3	20
Turnip tops	.0152	2.125	6.6	13.8			
Walnuts	.0092	.545	4.0	3.5	2.0	2.0	100
Wheat bran	.0341	.735	14.8	4.7			

813.2

DIRECTIONS FOR THE PREPARATION OF LEBEN

Leben is the name used in Egypt for a milk preparation made as follows:--

The milk is boiled down to one half, or in some cases to one-third, the original volume. This is preferably done in a double boiler. After condensation, the milk is set aside and cooled to a temperature a little above blood heat, or about 104°. A small opening is then made in the thick skin which covers the milk, and through this the ferment is introduced and distributed by stirring with a rod. Two Yogurt tablets should be used for each pint of milk. The vessel containing the milk is tightly covered, and the whole is wrapped in woolen blankets and kept in a warm place for about twelve hours. At the end of this time a thick curd forms, having the consistency of custard. It may be served like custard and eaten plain, or served with cream and sugar.

Leben is considered a great delicacy in the Orient, and is relished by most people. It is especially to be recommended for those who are compelled to take nourishment in a somewhat concentrated form. For example, when the diet is restricted to milk, as is sometimes recommended in Bright's disease and some other maladies, the quantity required is so great that it is difficult for the stomach to deal with the amount necessary to prevent loss of weight. Leben furnishes equal nourishment with half the volume, and has this advantage over ordinary buttermilk.

It is a good plan, after condensing the milk and adding the Yogurt ferment (in the proportion of one Yogurt tablet for each half pint of milk) to pour the milk into the teacups or bowls in which it is to be served on the table. After fermenting for twelve hours, or until a pleasant acid flavor is

developed, the fermented milk should be placed in a refrigerator, or other cool place, to prevent further development of the acid. Leben which has been exposed to fermentation for more than twenty-four hours should be mixed, when used, with an equal quantity of milk or thin cream.

JHK m 11-10'08

Editorial for Good Health.

COW'S MILK AND INFANT FOODS.

It is an interesting fact that the free use of cow's milk is chiefly confined to the most civilized nations. Among primitive tribes, milk is little used as an article of food. The use of milk in its ordinary fresh state is almost wholly confined to the English-speaking ~~pee~~ race. Those savage or half-civilized tribes that use milk employ it in the form of curd, produced by putting milk over night in a gourd. In Tartary milk is curdled by the addition of a ferment. Yeast is sometimes used, producing the well known, Kumyss. Another very peculiar ferment is also employed, producing a finer and more agreeable preparation known as Kiefer. The Germans make large use of ordinary sour milk. The same is true of most of the nations of southern Europe. Milk taken in this way is much more digestible than ordinary milk for the reason that the curds formed are soft and easily broken up, whereas the curds formed in the stomach by the action of the gastric juice upon fresh milk are tough and difficult of digestion, just such as may be seen at any time in the huge vats of the cheese factory. The retention of these curds in the stomach gives rise to fermentation, and, in many cases, putrefactive processes are set up by the filthy germs which find their way into the milk in great numbers. Whenever the gastric juice produced by the stomach is deficient in quality or quantity to such a degree that the normal antiseptic action of the gastric juice is prevented so that germs taken into the stomach are not killed, this putrefactive process takes place. The absorption of the poisons produced thereby result in sick headache, nervous headache, and especially the condition known as biliousness. Thousands of persons annually lose their lives because of bowel and other ~~The~~ troubles occasioned by the putrefaction of milk in the stomach and intestines.

A few weeks since, the writer while addressing a large audience on

the subject of diet, improved the occasion to test the general ef ect of milk on the average consumer. The question asked was, "How many persons present have observed that they are made bilious by the use of milk." More than one third of the audience promptly raised their hands. Any other article of food which was found to make one third of all the people sick would be discarded as unhealthy and unwholesome. The other two thirds who ~~ha~~ do not recognize that they are injured are nevertheless, in many instances, without doubt, more or less harmed. An unconscious damage is being done, the extent of which may not become apparent until years later in the form of rheumatism, neurasthenia, or some constitutional disorder. The gravest ailments have ~~the~~ very small beginnings, and the writer does not doubt that from the extensive use of cow's milk may be fairly attributed many evils which are ordinarily charged to other causes, such as over-work, adverse climate, etc. Many hundreds of persons have found relief from headache, bad taste in the mouth, biliousness, constipation, andother ailments, bymthe disuse of milk, substituting oleaginous nuts, such as almonds, hazel nuts, pecans, and various nut preparations.

The injurious effects of milk are most readily seen in children. Their feeble bodies are quickly sickened by the poisonous substances formed when milk is decomposed in the stomach and intestines. The tough curds formed by cow's milk are very different from the soft, friable, coagulated form when the gastric juice acts upon the natural diet of a young infant,-mother's milk. It ought to be generally known that cow's milk is not a substitute for mother's milk. Cow's milk is the proper food for calves, as their digestive machinery is constructed for the digestion of coarse grass, herbs, etc., and hence can cope with the tough crrds formed by the action of the gastric juice on cow's milk. The injurious effects of cow's milk are generally known, although not ~~appreci-~~

sufficiently appreciated. Every old nurses resorts to the use of oatmeal gruel, flour ball, and various other devices for so modifying cow's milk as to increase its digestibility. The result aimed at is to avoid the formation of tough curds. Many lives are saved by these various devices. The enormous sale of infant foods is another evidence of the general recognition of the evils of cow's milk. Few babies fed upon cow's milk escape damage thereby. This fact has led to the development of enormous industries devoted to the manufacture of substitutes for cow's milk,-so-called infant foods. These may generally be divided into two classes,-farinaceous and lacteal. The farinaceous products are commonly made from flour by exposure to the action of diastase and heat and is so modified that the starch is largely transferred into dextrine. These dextrinized foods are much more acceptable to the infant stomach than ordinary farinaceous preparations for the reason that the saliva of the young infant is much less active in digesting starch than that of adults. The lacteal infant foods chiefly consist of evaporated milk. While these have the advantage that they do not form hard, tough curds in the stomach of the infant, they nevertheless contain caseine in large quantities and in a form which readily undergoes decomposition in the stomach of the child. Most of these infant foods are a decided improvement upon milk taken in the ordinary way, but the farinaceous infant foods are deficient in the ~~feed~~ bone-making and blood-making elements and the milk contained in infant foods makes them ovjectionable for the reason that the caseine readily undergoes decomposition in the stomach, giving rise to biliousness, flatulence, constipation, and other distressing disorders. A need, which has long been recognized, is an infant food of purely vegetable origin, containing all the elements of nutrition in the proportion in which they are found in milk. Such a food may be the means of saving thousands of young lives every year.

(Nut Cracker).

LIVING ON MILK AND PEANUTS.

Mr. John A. Kraus, of Auburn, N. Y., has adopted a peanut and milk dietary. He tried the experiment during Lent and got along so well that he has continued this fare eversince. He buys daily a pint of roasted peanuts and a glass of milk, paying five cents for the pint of peanuts and one cent for the glass of milk, so that the expense of his food is exactly 42 cents per week. After following this dietary for eighteen days, he found that he had gained just five pounds, so he is in no danger of starvation and is actually improving on the simple fare. A pound of peanuts contains as much nourishment as nearly three pounds of the best beefsteak.

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A Preparation of Milk for Diabetic Patients.

Dr Sydney Ringer adds to a pint and a half of milk about three ounces of a 10 per cent. solution of acetic acid. This precipitates a curd, Caseinogen. It should be allowed to settle, and the clear fluid siphoned off and distilled water added. After settling this should be filtered and well washed with distilled water. If it is then well rubbed up in a mortar with some calcium carbonate, and water is added, all the caseinogen becomes dissolved the calcium carbonate soon settles, and the milky fluid can be decanted off. The dissolved caseinogen behaves just like milk. If rennet and a calcium salt is added and the mixture is heated to 104° F., it quickly clots, the caseinogen becomes changed into casein, which precipitates by combining with the calcium salt. Later experiments show that the caseinogen settles better after the addition of acetic acid if the milk is diluted with an equal quantity of water, and further it is filtered and the precipitate is washed on a calico filter, which permits of more rapid manufacture than if a paper filter is used. This solution is milk ~~without~~ ~~sugar~~ milk sugar. If 2 per cent. of glycerin is added, a not unpalatable form of milk is produced.-(British Medical Journal.)

(Ann. Jr. Med. Sc. May)

MILK.

All food elements represented,--proteids, fats, and carbohydrates. Only other animal foods like it is oysters.

Color due largely to casein, solution of which is opaque and emulsified fat. Also contains lactalbumin which constitutes about 1/7 of the proteid in cow's milk; 1/3 in human.
2 or 3 % of proteids, 4 % of fat, 4 or 5 % of lactose.

Casein is peculiar: contains no nuclein or uric acid; yields no carbohydrate when broken up.

Milk sugar does not easily ferment with yeast, but is readily fermented by x certain bacteria, forming lactic acid. Is a frequent cause of diarrhoea.

Fat of Milk. In state of emulsion. 1,500,000 globules in a drop size of pin head. Skim milk contains 1 % of fat; separated milk, 1/3 %. May also contain citric acid. Daily yield of cow equal to two or three lemons.

Milk of each species of animals adapted to its young. Milk of whale and walrus, 43 % of fat.

Bacteria in milk.

Fecal Matters. According to Backhaus, the people of Berlin consume 300 pounds of manure daily.

Digestion of Milk. Pint of raw milk, 3-1/2 hrs.; Skim milk, 3-1/2 hrs.; Sour milk 3 hrs.; Boiled milk 4 hrs.

Milk is not so readily absorbed as might be expected. Usually a loss of 9 or 10 %. Better absorbed in children than adults. Loss 4-1/2 % in children up to 12 years.

Boiling does not interfere with absorption. Milk is

not a perfect food for adults. Too bulky. Deficient residue, too expensive.

Milk cure gradually increased to 5 or 6 pints daily, taken every 3 or 4 hours.

Casein preparations substitutes for foods.

Protein plasmon.

S U G A R.

Monosaccharids; disaccharids.

Hexoses, pentoses.

Sugar not much used until since the middle ages.

Called "Indian salt" by the Greeks before the Christian era, also "honey made from reeds," it being obtained from India.

Only used by apothecaries.

General use began in 14th and 15th centuries.

Queen Elizabeth described as having a hooked nose and black teeth from eating so much sugar.

Honey was considered more wholesome because natural, and not a "product of forced invention."

Price of sugar in Scotland in 14th century was 43 cents a pound. Present average consumption, 80 pounds a year.

Sugar-cane contains 18% of sugar. Beets contain from 12 to 15%.

The maple tree produces 4 pounds of maple sugar in a season.

<u>Digestion of Sugar.</u>

Strong solutions of cane-sugar irritating.

Brandl showed 5.7% solution caused reddening of mucous membrane in dog. 10% made mucous membrane dark red. 20% caused great pain and distress. The irritation was accompained by much mucus and highly acid gastric juice.

Robertson injected 8 oz. 20% solution of cane-sugar into stomach of patient with gastric catarrh. Patient felt sick, and vomited acid fluid which put his teeth on edge. Had heart-burn and flatulence and severe pain in stomach. Invert sugar of same strength caused no discomfort. Experiment

repeated in other cases with same result. Invert sugar rapidly disappeared from the stomach while cane-sugar remained a long time.

Schüle found that cane-sugar delays digestion by the large quantity of mucus produced. Ogata got same result on dogs.

Fermentation of Sugar.

Lactic fermentation --levulose and lactose most fermentable, maltose least.

Butyric fermentation -- levulose and maltose most fermentable; lactose least.

Alcoholic fermentation -- maltose and invert sugar most fermentable; lactose least.

Assimilation of Sugar.

Levulose best assimilated. Glucose most rapidly absorbed, least readily assimilated. Cane-sugar pentoses not assimilated.

Levulose assimilation, 200 grammes; cane-sugar, 150 grammes; lactose, 120 grammes.

Nutritive Value of Sugar.

2-1/4 pounds equal to 1 of fat.

Sugar more rapidly burns than fat, hence is more efficient in protecting proteids.

Sugar a muscle food. Swiss guides. German army.

Mosso's experiments.

Sugar delays fatigue. Supports violent muscular work.

Harley took a pound of sugar a day. Increased his muscular power 60 to 75%.

Rowers.

German Army recommend sugar ration 2 ounces a day.

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NUTS AS A FOOD STAPLE.

In these days when the question of foodstuffs is daily becoming more urgent and absorbing it is natural that all available sources of supplies to meet one of the most urgent of all our human needs should be made the subject of careful investigation. The exigences of the great European war have compelled not only Germany but others of the belligerent nations to study nutritive values and the economics of food more critically than ever before. Every possible source of food supply is being drawn upon to the fullest extent possible by the nations of Central Europe. Efforts have even been made to extract nutrient material from such unpromising sources as straw and sawdust, naturally with no encouraging measure of success.

The writer has followed these researches and discussions with great interest. Numerous important facts in relation to human nutrition which have been long known to scientists but of which the common people have been ignorant have been brought to the attention of the hungry masses and have received practical application in the masterly efforts which have been made for their relief. It is probable that the problem of human nutrition is at the present time being solved in a more scientific and practical way by the German people than the world has ever seen done before.

In all this discussion, however, one of the first and most striking facts upon which public attention was focused after the beginning of the great conflict was the necessity for limiting the supply of flesh foods. The reason for this is obvious. All the densely populated nations of Europe depend chiefly upon outside sources for their meat supplies. This must be true of any densely populated country for the reason that an acre of land that is devoted to wheat, for example, will produce nearly ten times as much protein, one of the most essential of all the food principles, as the same area of land devoted to pasturage for beef cattle and,

as will be shown later in this paper, the same land devoted to nuts may produce an even greater amount of food protein together with other essential food principles. Notwithstanding this fact, the writer has seen no mention made of nuts in the discussions of food supplies which have grown out of the European war. The explanation doubtless is to be found in the fact that nuts have heretofore cut so small a figure in national food supplies that, under the present emergency conditions, they are naturally overlooked entirely. As a matter of fact, nuts have been regarded and used as a luxury rather than as a staple article of food; but as the public become better informed respecting the high food value of nuts and especially in view of the steadily rising cost of flesh meats, the nut is certain to gain higher appreciation, and the writer has no doubt that sometime in the future nuts will become a leading constituent of the national bill of fare and in so doing, will displace certain foodstuffs which today are held in high esteem but which in the broader light of the next century will be regarded as obnectionable and inferior foods and will give place to the products of the various varieties of nut trees which will then be estimated at their true worth, the very choicest of all substances capable of sustaining human life. Botanically, a nut is a fruit, but nuts differ so widely both in composition and appearance from the foods commonly called fruits that they are properly placed in a class by themselves.

In nutritive value the nut far exceeds all other food substances; for example, the average number of food units per pound furnished by half a dozen of the more common varieties of nuts is 3231 calories while the average of the same number of varieties of cereals is 1654 calories, half the value of nuts. The average food value of the best vegetables is 300 calories per pound and of the best fresh fruits grown in this country is 278 calories. The average food value of the six principal flesh foods is 810 calories per pound or one-fourth that of nuts.

The superior nutritive value of nuts is clearly shown by the accompanying tables based upon the analyses of Atwater and other authorities.

Table 1.

Composition of Nuts.
Composition and Fuel Value of the Edible Portion.

	Protein	Fats	Carbohydrates	Ash	Food Value per pound.
	per ct.	Per ct.	Per ct.	Per ct.	Cal.
Almonds	21.0	54.9	17.3	2.0	3,030
Brazil nuts	17.0	66.8	7.0	3.9	3,329
Filberts	15.6	65.3	13.0	2.4	3,432
Hickory nuts	15.4	67.4	11.4	2.1	3,495
Pecan nuts	11.0	71.2	13.3	1.5	3,633
English walnuts	16.7	64.4	14.8	1.3	3,305
Chestnuts, fresh	6.2	5.4	42.1	1.3	1,125
Chestnuts, dried	10.7	7.0	74.2	2.2	1,875
Acorns	8.1	37.4	48.0	2.4	2,718
Beechnuts	21.9	57.4	13.2	3.5	3,263
Butternuts	27.9	61.2	3.4	3.0	3,371
Walnuts	27.6	56.3	11.7	1.9	3,105
Cocoanuts	5.7	50.6	27.9	1.7	2,986
Cocoanuts shredded	6.3	57.3	31.6	1.3	3,125
Pistachios, kernels	22.6	54.5	15.6	3.1	3,010
Pine nuts or pinons	14.6	61.9	17.3	2.8	3,364
Peanuts, raw	25.8	38.6	24.4	2.0	2,560
Peanuts, roasted	30.5	49.2	16.2	2.5	3,177
Litchi nuts	2.9	.2	77.5	1.5	1,453

Table 11.

Composition of Meats (Atwater and Langworthy)

	Protein	Fat	Calories per lb.
Beef ribs	13.9	21.2	1,135
Porterhouse steak	19.1	16.1	975
Veal cutlet	20.1	7.5	695
Mutton	15.1	14.7	890
Mutton chops	13.5	28.3	1,415
Lamb	15.9	13.6	860
Pork chops	13.4	24.2	1,245
Ham, smoked	14.2	33.4	1,635
Bacon "	9.1	62.2	2,715
Sausage, Frankfort	19.6	18.9	1,155
Beef soup	4.4	0.4	120
Chicken (fowl)	13.7	12.3	765
Goose	13.4	29.8	1,475
Turkey	16.1	18.4	1,060
Duck	14.3	33.4	1,805
Squab	18.6	22.1	1,430
Guinea hen	23.1	6.5	870
Quail	25.	6.8	935

Table 111.

Composition of Cereal Food (Langworthy).

	Protein	Fat.	Carbo-hydrates.	Ash.	Food value per pound.
	Per ct.	Per ct.	Per ct.	Per ct.	
Flour, meal, etc:					
Entire wheat flour	13.8	1.9	71.9	1.0	1,650
Graham flour	13.3	2.2	71.4	1.8	1,645
Wheat flour, patent roller process					
--High grade and medium	11.4	1.0	75.1	.5	1,635
Macaroni, vermicelli, etc.	13.4	.9	74.1	1.3	1,645
Wheat breakfast food	12.1	1.8	75.2	1.3	1,680
Buckwheat flour	6.4	1.2	77.9	.9	1,605
Rye flour	6.8	0.9	78.7	.7	1,620
Corn meal	9.2	1.9	75.4	1.0	1,635
Oat breakfast food	16.7	7.3	66.2	2.1	1,800
Rice	8.0	.3	79.0	.4	1,620
Tapioca	.4	.1	88.0	.1	1,650
Starch			90.0		1,675

Table IV.

Composition of Vegetables (Edible Portion).

	Water	Protein	Fat	Carbohy drates.	Calories per lb.
Beans, dried	12.6	22.5	1.8	59.6	1,520
Beans, lima					
Beans, string.	83.0	2.1	.3	6.9	170
Beets	70.0	1.3	.1	7.7	160
Cabbage	77.7	1.4	.2	4.8	115
Celery	75.6	.9	.1	2.6	65
Corn, green(sweet)					
Edible portion	75.4	3.1	1.1	19.7	440
Cucumbers	81.1	.7	.2	2.6	65
Lettuce	80.5	1.0	.2	2.5	65
Mushrooms	88.1	3.5	.4	6.8	185
Onions	78.9	1.4	.3	8.9	190
Parsnips	66.4	1.3	.4	10.8	230
Peas	74.6	7.0	0.5	16.9	440
Potatoes	62.6	1.8	.1	14.7	295
Rhubarb	76.6	.4	.4	2.2	60
Sweet potatoes	55.2	1.4	.6	21.9	440
Spinach	92.3	2.1	.3	3.2	95
Squash	44.2	.7	.2	4.5	100
Tomatoes	94.3	.9	.4	3.9	100

Table V.

Composition of Fruits, Yearbook of Dept. of Agriculture, 1915. (C. J. Langworthy).

Kind of Fruit	Water	Protein	Ether extract	Nitrogen-free extract	Carbohydrates	Crude fiber	ash	Fuel value per pound
Fresh Fruits	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Calories.
Apples	84.6	0.4	0.5	13.0		1.2	0.3	290
Apricots	85.0	1.1			13.4		.5	270
Avocado	81.1	1.0	10.2		6.8		.9	512
Bananas	75.3	1.3	.6	21.0		1.0	.8	460
Blackberries	86.3	1.3	1.0	8.4		2.5	.5	270
Cactus fruit	79.2	1.4	1.3	11.7		3.7	2.7	375
Cherries	80.9	1.0	.8	16.5		.2	.6	365
Cranberries	88.9	.4	.6	8.4		1.5	.2	215
Currants	85.0	1.5			12.8		.7	265
Figs	79.1	1.5			18.8		.6	380
Gooseberries	85.6	1.0			13.1		.3	255
Grapes	77.4	1.3	1.6	14.9		4.3	.5	450
Guava	82.9	1.3	.7	8.0		6.6	.5	315
Huckleberries	81.9	.6	.6		16.6	.3		345
Lemons	89.3	1.0	.7	7.4		1.1	.5	205
Mango	87.4	.6	.4	9.9		1.2	.5	220
Musk Melons	89.5	.6		7.2		2.1	.6	185
Nectarines	82.9	.6			15.9		.6	305
Olives	67.0	2.5	17.1	5.7		3.3	4.4	407
Oranges	86.9	.8	.2		11.6		.5	240
Peaches	89.4	.7	.1	5.8		3.6	.4	190
Pears	80.9	1.0	.5	15.7		1.5	.4	163
Persimmons (Japanese)	80.2	1.4	.6	15.1		2.1	.6	174
Pineapple	89.3	.4	.3	9.3		.4	.3	200
Plums	78.4	1.0			20.1		.5	395
Pomegranates	76.8	1.5	1.6	16.8		2.7	.6	461
Prunes	79.6	.9			18.9		.6	370
Raspberries (Red)	85.8	1.0		9.7		2.9	.6	255
Rhubarb Stalks	94.4	.6	.7	2.5		1.1	.7	105
Strawberries	90.4	1.0	.6	6.0		1.4	.6	180
Watermelons	92.4	.4	.2		6.7		.3	140

with the exception of smoked bacon there is no flesh food which even approaches the nut in nutritive value, and bacon owes its high value to the fact that it consists almost exclusively of fat.

That the nut is appreciated as a dainty is attested by the frequency with which it appears as a dessert and the extensive use of various nuts as confections. That nuts do not hold a more prominent place in the national bill of fare is due chiefly to two causes; first, the popular idea that nuts are highly indigestible, and second, their comparatively high price.

The notion that nuts are difficult of digestion has really no foundation in fact. The idea is probably the natural outgrowth of the custom of eating nuts at the close of a meal when an abundance, more likely a super-abundance, of highly nutritious foods has already been eaten and the equally injurious custom of eating nuts between meals. Neglect of thorough mastication must also be mentioned as a possible cause of indigestion following the use of nuts. Nuts are generally eaten dry and have a firm hard flesh which requires thorough use of the organs of mastication to prepare them for the action of the several digestive juices. Experiments made in Germany showed that nuts are not digested at all but pass through the alimentary canal like foreign bodies unless reduced to a smooth paste in the mouth. Particles of nuts the size of small seeds wholly escaped digestion.

Having been for more than fifty years actively interested in promoting the use of nuts as a staple food, I have given considerable thought and study to their dietetic value and have made many experiments. About twenty-five years ago it occurred to me that one of the above objections to the extensive dietetic use of nuts might be overcome by mechanical preparation of the nut before serving so as to reduce it to a smooth paste and thus insure the preparation for digestion which the average eater is prone to neglect. The result was a product which I called peanut butter. I was much surprised at the readiness with which the product sprang into public favor. Several years ago I was informed by a wholesale

grocer of Chicago that the firm's sales of peanut butter amounted on an average to a carload a week. I think it is safe to estimate that not less than one thousand carloads of this product are annually consumed in this country. The increased demand for peanuts for making peanut butter led to the development of "corners" in the peanut market and more than doubled the price and must have had an equally marked influence upon the annual production.

I am citing my experience with the peanut not for the purpose of recommending this product, for I am obliged to confess that I was soon compelled to abandon the use of peanut butter prepared from roasted nuts, for the reason that the process of roasting renders the nut indigestible to such a degree that it was not adapted to the use of invalids, but simply as an illustration of the readiness with which the public accepts a new dietetic idea when it happens to strike the popular fancy. Ways must be found to render the use of nuts practical by adapting them to our culinary and dietetic customs and to overcome the popular objections to their use by a widespread and efficient campaign of education.

Attention has already been called to the superior nutritive value of the nut. It has other excellencies well worthy of consideration; for example, the protein of nuts is of the very choicest character. Recent investigations by Rubner, Osborne, Mendel, and others have shown that every plant produces its own special varieties of proteins. There is indeed a wide difference even between the proteins of various cereals and the proteins of many vegetables differ so widely in character from those of the human body that it is doubtful whether to any extent they can be utilized for human nutrition. Fortunately the potato is in this regard an exception and furnishes a very excellent type of protein. This objection does not apply to nuts. The proteins of nuts are in fact so very closely allied to those of the animal body that food chemists of a generation ago referred to the protein of nuts as vegetable casein because of its exceedingly close resemblance to the protein of milk.

The fats of nuts, their leading food principle, are the most digestible of all forms of fat. Having a high melting point they are far more digestible than animal fats of any sort. The indigestibility of beef and mutton fat has long been recognized. The fat of nuts much more closely resembles human fat than do fats of the sort mentioned. The importance of this will be appreciated when attention is called to the fact that fats entering the body do not undergo the transformation changes which take place in other foodstuffs; for example, protein in the process of digestion is broken into its ultimate molecular units. Starch is transformed into sugar which serves as fuel to the body but fats are so slightly modified in the process of digestion and absorption that after reaching the blood and the tissues they are reconstructed into the original form in which they are eaten; that is, beef fat is deposited in the tissues as beef fat without undergoing any chemical change whatever; mutton fat is deposited as mutton fat; lard as pig fat, etc. When the body makes its own fat from starch and sugar, the natural source of this tissue element the product formed is sui generis and must be better adapted to the body uses than the animal fat which was sui generis to a pig, a sheep, or a goat. It is certainly a pleasant thought that one who rounds out his figure with the luscious fatness of nuts may felicitate himself upon the fact that his tissues are participating in the sweetness of the nut rather than the relics of the sty and the shambles. It is true that nuts are poor in carbohydrates; that is, they contain no starch and little sugar, but this deficiency can be easily supplied by fruits, as will be readily seen by reference to Table V.

Of the three great food principles required for human nutrition, protein, fats, and carbohydrates, the nut supplies two--protein and fats in rich abundance, and of very finest quality. The amount of protein found in fruits with very few exceptions is so small as to br insignificent; fats are practically wholly absent from fruits, while sugar and dextrine are abundant. Fruits are thus the natural complement of nuts.

The amount of protein contained in nuts is with two or three exceptions

small as compared with meats, and even some of the cereals; but the studies of nutrition which have been made within the last score of years by Chittenden and numerous other investigators have clearly established the fact that protein which is chiefly represented in the ordinary bill of fare by lean meat, is needed only in very small amount. If the amount of protein eaten equals ten per cent. of the total ration the body will receive an abundant supply of material for repairing its nitrogenous tissues, the only function for which protein is essential. Some nuts, as the pine nut and the peanut are rich in protein. A pound of pine nuts contains as much protein as a pound and a half of lean meat, besides furnishing the equivalent to two-thirds of a pound of butter. The almond is also rich in protein.

But nuts have another special excellence which is worthy of consideration. Recent researches have shown the paramount importance of vitamines--certain subtle element which are needed to activate or set in operation various processes within the body which are essential to complete nutrition. The vitamines of rice and other cereals are removed with the bran; hence an exclusive diet of polished rice gives rise to beriberi. Meat contains vitamines in very small amounts, for vitamines are produced only by plants. The vitamines found in flesh foods represent only the small residue of the supplies which the animal gathered from the grass, corn and other vegetable products which constitute its food.

Twenty years ago, when the diet of sailors consisted chiefly of salt pork, scurvy was a dreaded scourge which often disabled whole ship crews and sent many a poor seaman into "Davy Jones's locker." The cooking of animal foods destroys the vitamines which they contain. Infants suffer from scurvy when fed on sterilized or pasteurized milk. There is good reason for believing that pellagra is due to a deficiency of vitamines, which are conspicuously absent from a dietary consisting of "sow belly," molasses, tea, coffee, lard, cornmeal, fine flour and polished rice.

Nuts are rich in vitamines. In fact the nut consists of the choicest

aggregation of all the materials essential for the building of sound human tissues, done up in a hermetically sealed package ready to be delivered by the gracious hand of Nature to those who are fortunate enough to appreciate the value of this choicest of all earth's bounties.

As already noted, nuts consist almost wholly of the two principles, fat and protein. The same is true of meats. Nuts contain more fat and less protein and in this particular as well as others which have been mentioned are better prepared to serve as nutrients to the body than are meats. Besides, nuts have the advantage of being clean, free from the products of disease and putrefaction Meats of all sorts, as found in the market, with the exception of canned meats, abound with putrefactive bacteria to an astonishing degree. This is true of dried, smoked and salted meats as well as of the fresh meats and game which are displayed upon the walls of the meat shop. An examination of various meats made some time ago by A. W. Nelson, bacteriologist of the Battle Creek Sanitarium, showed the presence of putrefactive bacteria in almost unbelievable numbers as will be seen by an inspection of the following tables:-

Table VI.

Specimen	No. Putrefactive Bacteria per ounce.
1. Large sausage	12,600,000,000
2. Small sausage	19,890,000,000
3. Round steak	16,800,000,000
4. Roast beef	16,800,000,000
5. Smoked ham	1,293,600,000
6. Hamburger steak	3,870,000,000
7. Pork	3,781,200,000
8. Porterhouse steak	900,000,000
9. Sirloin (steak done)	11,340,000,000
10. Tenderloin (well done)	756,000,000
11. Tenderloin (rare)	5,040,000,000

Repeated subsequent examinations have given similar results. These results also agree with observations made by various other German and American bacteriologists. Decomposition of animal flesh begins immediately after the animal dies. Within twenty-four hours after killing, even though the carcass is kept in an ice box or refrigerator, the whole mass is permeated with pu-

trefactive bacteria. Refrigeration even to a point close to freezing delays but does not prevent the growth of putrefactive organisms although at lower temperatures the usual volatile products which give notice to the presence of putrefaction by an odor of decay are not produced. Persons whose stomachs manufacture a liberal amount of hydrochloric acid, an essential constituent of healthy gastric juice, are able to disinfect even highly putrescent meat, so that they apparently do not suffer any immediate injury when such meat enters the stomach. In a stomach which produces little or no hydrochloric acid, the process of putrefaction continues all the way through the alimentary canal, giving rise to the same poisonous substances which are present in the putrefying carcass of a dead rat or any other dead animal, and produces intestinal or alimentary toxemia with the multitude of mischiefs which grow out of this condition, among which may be mentioned all sorts of skin troubles, high blood pressure, apoplexy, premature senility, Bright's disease, heart failure, gallstones--a list which might be increased by the addition of scores of other common, chronic maladies.

When one recalls the statement made before the congressional committee by the chief of the United States meat inspection service that if all animals any part of which was diseased were rejected by inspectors, not more than one in a hundred would pass muster; and when one also reflects upon the wide prevalence of tuberculosis in animals,-- at least ten per cent. of all the cows in the country are known to bertuberculous,--and the growing prevalence of tapeworm and trichinae, diseases which are exclusively derived from the eating of flesh, and then contemplate the purity and perfection of the choice little food packets which we call nuts, it is easy to be persuaded that a substitution of nuts for flesh foods, even on a very large scale, would be not only a perfectly safe procedure, but one which would be followed by the most desirable results.

The use of nuts as a staple article of food is not an experiment. All the higher apes, man's nearest relatives in the animal world, thrive on nuts. Many savage tribes live almost entirely on nuts. The Indians of the foothills of California gather every fall large quantities of nuts which they store for winter nuse. The early settlers of California reported also that many tribes of Indians in that part of the United States lived almost wholly upon acorns. Before the great oak forests of this country were cut down for lumber, millions of hogs were fattened on mast, and the price of pork depended more upon the acorn crop than on the corn crop. The Peasantry of southern France and northern Italy during half of a year make two meals a day on chestnuts.

The objection commonly urged that nuts are too expensive to enter largely into the ordinary bill of fare at first sight appears to be valid, but upon examination this objection almost if not wholly disappears. For example, a pound of pine nuts which is more than the equivalent in nutritive value to two and a half pounds of the best beefsteak and two-thirds of a pound of butter, can be bought wholesale for twenty-five cents. The cost of the equivalent food value in meat and butter would be at least sixty to seventy cents, or more than double the cost of the nuts. A pound of almonds can be bought at wholesale for forty cents, and has food value equal to that of meat which would cost a dollar or more. A pound of peanuts can be bought at wholesale for seven or eight cents, and furnishes nutritive value equivalent to more than a pound of beefsteak and a half a pound of butter which would cost forty-five to fifty cents, or seven times as much. No objection can be offered to the fact that we are comparing wholesale with retail prices, for the reason that nuts do not readily spoil as do meat and butter, but will keep in perfect condition for months. Further it is entirely reasonable to suppose that the price of nuts may sometime in the future be considerably reduced when the cultivation of nuts becomes more general, and especially when the United States Forestry Department becomes convinced that it would

be a sensible thing to cover with nut trees some of the large areas which have in the last fifty years been laid waste by deforestization. The planting of nut trees along all the public highways of the country would in less than twenty years result in a crop the feed value of which would be greater than that at present produced by the entire livestock industry of the country.

The high price of meat of which so much complaint has been made in recent years is not likely to recede. The high price is not due to manipulations of the market, but to natural causes the chief of which is the limitation of pasturage and is the consequence of a decrease in the number of livestock. As the country becomes more and more densely settled, the difficulty of supplying the demand for meat will increase, and in time the necessity for utilizing every foot of ground in the most efficient manner, will necessarily bring about a change in the dietetic habits of people. Not a single example can be found in the world of a densely populated country dependent upon its own resources in which flesh foods constitute any considerable part of the national bill of fare. Since Germany has been nearly shut off from the outside world by the present war, the government has found it necessary to restrict the consumption of meat to one-half pound per week for each adult. All other European countries are equally dependent on outside sources for their meat supply.

The time will certainly come when nuts and nut trees willbecome a most important food resource. If a reform in this direction could be effected within the next ten years, the result would be a disappearance to a large extent of the complaint of the high cost of living. M. Hill said the basis for complaint was not the high cost of living, but the cost of high living. I should prefer to say that the real cause for complaint was wrong living rather than high living, or necessarily high cost. With right living the cost will be automatically reduced. For example, suppose a person were content to choose the peanut as his source for protein and fat, the elimination of the butcher's bill for meat and the grocer's bill for butter would at once cut out two-thirds of

the expense incurred for food.

When a student in college more than forty years ago, I was already making dietetic experiments and lived three months on a diet such as I have suggested, at an average expense of exactly six cents a day. This was the total amount expended for raw foodstuffs. I paid my landlady five times as much for preparing and serving the food, and had reason for believing that some portion of my supplies was utilized by others than myself. As evidence of the fact that the experiment was not dangerous, I may add that I have pursued the same meatless dietary during my entire lifetime since, as I had done for ten years before, and I am still alive and hard at work. Man is naturally a frugivorous animal. According to Cuvier, the great French naturalist, the natural diet of human beings, like that of those other primates, the orangoutang, the chimpanzee and the gorilla, consists of fruits, nuts, tender shoots and cereals. A sturdy Scotch highlander informed me that his diet consisted of bross, bannocks, and potatoes, and that he rarely ever tasted meat. When asked what he fed his dogs, he replied, "The same as I eat myself, sir." The highbred foxhounds of the southern states are fed on cornmeal, oatmeal and bread, and rarely taste flesh of any sort. Dogs thus fed are hardier, healthier, have more endurance, better wind, keener scent, greater intelligence, and are more easily trained than meat fed dogs. A diet which is safe for carnivorous animals must certainly be safe for human beings who belong to a class of animals all representatives of which the exception of man are flesh abstainers.

Some years ago I experimented with various sorts of carnivorous animals for the purpose of ascertaining whether nuts could be made a complete substitute for meat. Among the various animals utilized for the experiment was a young wolf from the northwest that had never eaten anything but fresh raw meat. After giving the animal one day to get accustomed to its new surroundings and to acquire a good appetite I gave him a breakfast of nuts properly prepared

and was delighted to find that he took to the new ration without the slightest hesitation and remained in excellent health during the several months of the experiment. I succeeded perfectly in substitutint nuts for meat with all the animals experimented upon including a fish hawk, with the single exception of an old bald headed eagle which refused to be converted.

I have a suspicion that the so-called carnivorous animals were all at some remote time nut eaters; the so-called carnivorous teeth would be as useful in tearing off the husks of cocoanuts and similar fruits as for tearing and eating flesh.

As economic argument for the general adoption of nuts as a suitable article of food is the enormous increase in food resources which such a change would bring about. Some years ago, an experianced stock raiser informed the writer that it takes two acres of land and two years to produce a steer weighing 600 pounds when dressed. Fresh meat is three-fourths water; hence, the food material actually represented by such an animal would be considerably less than one hundred and fifty pounds, allowing for the weight of the bones. The food value, estimated as dried meat, would be about sixteen hundred calories per pound or the same as an equal quantity of wheat meal. That is, an acre of land would produce in the form of beef the food equivalent of seventy-five pounds of wheat in two years, whereas a single acre of grain would produce on an average, even when poorly cultivated, in two crops not less than thirty-two bushels of more than 1900 pounds of wheat, or more than twenty-five times as much food as the same land would produce in the same length of time in the form of beef. Humboldt showed that the banana would furnish sustenance for twenty-five times as many people as could be nourished by the wheat produced by the same area of land; and according to Hutchinson, the chestnut tree is capable of producing on a given area a still larger amount of nutrient material than the banana. In other words, an acre of ground covered with chestnut trees in full bearing will furnish food for more than six hundred times as many people as could be supported by the

same area devoted to meat production.

As a source of protein and fats the nut is vastly superior to the ox and the pig. The nut is sweeter, clearner, safer, healthier and cheaper than any possible source of animal products.

This choicest product of Nature's laboratory is just beginning to be appreciated. When the Nut Growers' Association celebrates its one hundredth anniversary it is safe to predict that the descendant of the present generation of nut growers who have followed the example of their forebears will be living in opulance and will be regarded as the saviors of their country while the great abattoirs and meat packing establishments will have ceased to exist, and the merry click of the nut cracker will be heard throughout the land.

Paper to be read before the National Nut Growers' Association at its meeting at Jacksonville, Florida, November 22 to 24, 1916.

613.29

NUT FOODS IN A NUT SHELL.

Characteristic qualities of nut foods which render them superior to all other food substances.

1. Nuts are the choicest products of the vegetable kingdom, the very quintessence of nutrient material.

2. Nuts are, with other fruits, the natural food of the human species, hence the best adapted to the nourishment of the human body.

3. Nuts contain a large proportion of nutrient material. They are the purest and most concentrated of all nutrients.

4. Although rather indigestible in their raw state, when properly prepared, as in our various nut products, they are the most easily assimilable as well as the most nourishing of foods.

5. Nuts contain little or no starch, ~~xxxx prepaxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx~~ hence can be freely eaten by persons who cannot digest cereals or starchy vegetables in any form. This renders them valuable to the great class of invalids who through their inability to digest starch are restricted to an almost exclusive diet of meat, which soon becomes loathesome to the taste, as well as productive of nervous disorders, biliousness, Bright's disease, and other maladies.

6. Nuts are the vegetable analogue of meat and a perfect substitute for it in every respect, having the added advantage that they are entirely free from disease, from ptomaines and other poisonous substances resulting from putrefaction, so that they may be freely used without fear of evil consequences.

7. Nuts also contain the nutrient elements found in milk and eggs, so that the use of animal products may be dispensed with, a dietetic precaution very important and even essential in many cases of biliousness, sick headache, fevers, diabetes, dilatation of the stomach and other maladies, milk being the only exception.

8. Most fattening, best blood and strength-producing of all foods, whether natural or artificial.

Nuts have been very appropriately termed vegetable meat. In popular parlance the kernels or edible portions of nuts are termed nut meats. Nuts resemble meats in a number of particulars. They contain a large proportion of proteid substances. Some nuts contain as much as 50% more of albuminous substances than the best beefsteak. In other words, in a pound of nuts-- peanuts for example-- there is a pound and a half of beefsteak, in addition to the other invaluable nutritive elements which the nut contains. Besides this large proportion of a most digestible albuminoid substance, nuts contain on an average about 50% of a delicate and very digestible fat. Nuts contain little or no sugar, and with the exception of the chestnut, which contains nearly 70% of starch, they are almost entirely free from starch. The proportion of phosphates and other salts contained in nuts is large, amounting in some cases to more than 3%.

Nuts may then be fairly be regarded as the vegetable analogue of meat. They are, in fact, a more perfect nutrient than meat, as they are capable of sustaining human life for an indefinite period, whereas an exclusive diet soon results in serious disease, because of the poisonous substances which are always found in dead flesh. An animal corpse, in fact, is from a sanitary standpoint possessed of all the obnoxious and repulsive characteristics of a human corpse, and from a physiological standpoint is just as antagonistic to human life. Nuts are a pure diet, and with fruits and grains constitute the natural food of man, as they do of the gorilla, the chimpanzee, the orang-outang, and other anthropoid apes, which, the most manlike of all the animal creation, are still holding up before the human race the dietetic standard established by the Creator and adhered to by our primitive ancestors.

John Harvey Kellogg, M. D.,
Battle Creek, Mich.

THE PAPAYA AS A HEALTH FOOD

I became acquainted with the papaya in Cuba 40 years ago and have had a hankering for it ever since. It is certainly one of the choicest of the many marvelous fruits which the tropics produce. Every time I have come to Florida I have looked for papayas. I happened two or three times to be able to get a taste of the fruit here in Miami, but usually failed to find it. Last spring when I was here I heard that you had planted out three or four hundred acres which would be coming into bearing this fall. I thought you certainly would be swamped with a tremendous crop for which you would not be able to find a market, so I came down this winter to help you eat it up. I am delighted to see that the demand is fully equal to the supply. I hope this new industry will grow to such proportions that the rest of the country may be able to share this excellent fruit with you. I am feasting on papayas ever day and quite agree with one of my secretaries who remarked the other day, "These papayas grow better every day." It is a glorified melon which has climbed into a tree to display its superior qualities. Its delicate tropical fragrance and delicious satisfying flavor are qualities of which one does not tire.

Studies in nutrition laboratories have in recent years shown us more clearly than was understood before the enormous importance of fruit as a dietary staple. There is a natural craving for fruit which indicates an instinctive recognition of its value. Fruits are the best source for certain elements of foods which control the nutritive processes of the body and aid in the utilization of other foodstuffs. These substances, known as vitamins, are the most remarkable of all food or chemical substances which have ever been discovered. As a matter of fact they

are not yet discovered for no one has ever seen a vitamin. They are highly potent in quantities so small that they cannot be measured by the most delicate chemical methods, and yet they are so important that when even one of them is absent from an animal's food it quickly languishes and ultimately dies.

For convenience, vitamins are named after the letters of the alphabet and are known as A, B, C, D, etc. Vitamin A makes young animals grow and enables the body to resist the attacks of germs. When it is absent, children and small animals get sore eyes and stop growing. When vitamin B is absent, growth is arrested and paralysis develops. A few years ago 15,000 people died in the Philippine Islands every year from beriberi due to this cause. The absence of vitamin C produces scurvy. A deficiency of vitamin C is one of the causes of imperfect and decayed teeth. Bottle-fed babies often die of scurvy because vitamin C is lacking. Florida oranges are saving the lives of thousands of babies all over the country because they are rich in vitamin C. Vitamin D prevents rickets and helps the body to utilize lime in building the bones. When it is absent the bones are flexible and permanent deformities develop. People who are bow-legged, knock-kneed or chicken-breasted had rickets when they were babies, because they did not get enough vitamin D.

There is a great difference in the distribution of these vitamins in various foodstuffs. Vitamins A and D are chiefly found in milk or butter, spinach and other greens. B is found in almost all natural foods. C is found in fresh foods, especially fruits and greens. It is easily destroyed by cooking.

I have been especially interested in investigating the vitamin content of the papaya. Work done in Honolulu and the Dutch East Indies indicates that the papaya is rich in vitamin C which makes the orange

so valuable and is very rich in vitamin A. This vitamin is associated with the yellow color of foods and is found not only in butter but in yellow corn and carrots. The yellow color of the papaya led me to suspect that it contains vitamin A, and on investigation I find that studies which have been made in Honolulu and the Dutch East Indies show the papaya to be very rich in vitamin A. This is highly important, for vitamin A is rare in fruits. The D vitamin which prevents rickets is usually associated with vitamin A, but these vitamins are often deficient, and in countries where there is a lack of sunshine rickets is on this account very common. It has been estimated that in the Lake region nearly half the population are suffering more or less from the consequences of rickets in infancy and cod liver oil is being recommended as necessary for all babies to insure against rickets.

No research has as yet been made to determine certainly whether this vitamin D is present in the papaya, but the fact that it is very rich in vitamin A is good reason for believing that vitamin D is there also, for these two vitamins are practically always found together. To make the matter certain I am having a special investigation made to settle the question definitely. If our research should prove, as I believe it will, that vitamin D is present in the papaya, this fact alone should create an enormous demand for this fruit. I am certain that every one of the several hundred thousand babies that are now being fed cod liver oil would be very glad to be given papaya marmalade instead .

And it is not only the babies that suffer from lack of vitamin D, but grown people as well. This particular vitamin seems to be in some respects a substitute for sunshine. Experiments made in the laboratory

of the University of Wisconsin show that animals might be cured of rickets either by giving them sun baths or by feeding them food rich in vitamin D. Practically everybody living in the United States north of the Mason-Dixon line and east of the Mississippi river is suffering for lack of sunshine, and if we can get bottled sunshine in such delicious form as that in which the papaya presents it we shall develop a tremendous appetite for this splendid tree melon.

I am investigating two other points of much interest in relation to the papaya. Most fruits are of great value in the diet because they combat acidosis. There is a natural tendency to the accumulation of acids in the tissues. An excess of acids causes fatigue, loss of appetite, headache and premature old age. A research made in the laboratory of the Battle Creek Sanitarium some years ago by Dr. Blatherwick, of Yale University, showed that all fruits are rich in alkalies which neutralize the poisonous acids of the body and so help to maintain the necessary alkali reserve of the blood. This is a fact of great importance because so many of our foods, especially meats, eggs and even breakfast foods contain an excess of acids. A bread and meat diet, as McCollum has pointed out, is on this account about the worst diet a person can take. Vegetables and fruits are the natural antidotes for disease producing acids. Blatherwick showed the cantaloupe to be richer in these useful organic alkalies than any other food. The analyses thus far made of the papaya show it to be a strong rival of the cantaloupe and possibly it will prove to be superior. I am now having a study made in our research department to determine its status. Dr. Sansum, of San Jose, Calif., and Dr. Oscar H. Rogers, Medical Director of the New York Life Insurance Co., have shown that persons suffering from Bright's disease and

high blood pressure are wonderfully benefited by a diet rich in food alkalies. I have many times witnessed a remarkable rejuvenating effect from an alkalinizing diet. I am confident that further research will show that the papaya is a most valuable addition to this class of foods. Old age is a very prevalent disease, and any food that possesses special virtue as a means of holding Old Father time at bay, ought to be in great demand.

One more point of interest is the reputed digestive properties of the papaya. It has long been known that the stems, leaves and green fruit of the papaya contain a digestive ferment, papayotin, which, like pepsin, will digest albumen. In the process of ripening this milky juice and presumably the papayotin which it contains disappears from the fruit. It will be easy to determine whether or not the ripe fruit has any digestive properties and I am having a study of this now made. I feel quite sure that it will be found to be inactive. A good medicine is not likely to be a good food. Pepsin fed to cats caused their stomachs to stop making pepsin. Mother Nature is a good cook and wisely leaves the medicine out when she prepares the papaya for the table. If the papaya were a good digestant, it would be sold as a medicine in drug stores. It is destined, I hope, to prove another addition to the great contribution which Florida has made to the welfare of the people of the United States and of the world.

The study of the papaya from a health standpoint has only just begun, but the facts already known indicate that the papaya possesses qualities which make it capable of rendering a priceless service to the people of the United States. Practically everybody in this country, and for that matter in most other civilized countries, is suffering from lack of vitamins. Our ordinary diet includes so many denatured foodstuffs that the average bill of fare is practically always lacking in one or more essential vitamins. McCarrison, an eminent English authority, attributes most of the malnutrition, so-called neurasthenia, anemia and various other nutritive disorders from which a large part of the adult population of the United States is suffering to a deficiency of vitamins. The indications are very definite that the papaya contains a full assortment and rich supply of all the important vitamins. In this respect it differs from the cantaloupe and other melons.

When vitamins are lacking in the food of animals they are dwarfed in stature. Lack of vitamins stops the growth of children. Professor Fairfield Osborne and Dr. Davenport have shown by a study of the measurements made of drafted men at the time of the World War that there has been a falling off in the average height of the American men since the Civil War. We are losing stature and very likely because of the extensive use of fine flour bread, polished rice and other foods deficient in vitamins. It is the vitamins which make children grow. The papaya supplies these in abundance and if every boy and girl now living in the United States could have an opportunity to feast on papayas every day, the result would doubtless

be within a generation an increase of an inch or two in stature of the average American.

I am sure that when the people of the North become thoroughly acquainted with this delicious fruit and are educated to appreciate its precious value from a dietetic standpoint southern Florida will find a ready market for all the papayas it is able to produce.

The Useful Potato

The potato is probably more valuable as a special diet food than any other food known. Its real value has not been half appreciated hitherto. It has long been known that the potato is of special value in the treatment of rheumatism and gout, but the importance of the potato as a means of supplying alkaline substances to neutralize the abnormal acids which constantly tend to develop in the body, has not been appreciated until recently.

Through the experiments of Hindhede, the eminent Danish physiologist, it is now known that the potato is one of the most useful of all food substances. Doctor Hindhede found that it was possible to live exclusively upon potatoes with the addition of some wholesome fat, not only for a few days, but for months, and even years.

The substitution of potatoes in large part for cereals and breakfast foods of all sorts will be found a most wholesome change for most people, especially for people of sedentary habits.

Eat More Potatoes

The potato is not only an easily digestible foodstuff but possesses higher food value than is generally supposed. About one-fourth of the weight of the potato is food substance, consisting chiefly (nine-elevenths) of starch. Of the remainder, three-fifths are protein and fats. But what it lacks in fat and protein, it makes up in salts, which constitute nearly five per cent of its dry substance and are perhaps its most characteristic quality from a dietetic standpoint and one of its chief excellences. These salts consist chiefly of potash, and in the ordinary form in which they are supplied do a most important service in maintaining the alkaline condition of the blood, which is essential to good health and resistance to disease.

One Of The Most Nutritious Of Foods.

The great nutritive value of the potato, notwithstanding the fact that it is three-fourths water, may be best shown by comparing it with other known foods. A study of the nutritive value of various commmon foodstuffs shows that one pound of baked potato is equivalent in total nutritive value to the following foods in the quantities indicated: 57/8 ounces boiled beef; 1 pound of chicken; 1 1/2 pounds of codfish; 2 1/4 pints of oysters (solids); 4 pints of clams (in shell); 4 1/2 pints of beef juice; 10 pints bouillon or beef tea; 1 1/8 pints while milk; 3 pints skimmed milk; 8 eggs; 9 ounces baked beans; 7 ounces bread; 1 3/4 pints oatmeal or cornmeal mush; 1 1/3 pints hominy (cooked); 1 pint boiled rice; 1 pound of bananas; 2 pounds parsnips (cooked); 1 pound green peas (cooked); 3 pounds beets (cooked); 4 pounds of boiled cabbage; 4 pounds radishes; 5 pounds tomatoes; 5 pounds turnips (cooked); 6 1/2 pounds cucumbers.

From the above it will readily appear that the potato is one

of the most nourishing of our common foods. Its value is still further emphasized by the fact that steamed or mashed potato digests in two or three hours, whereas roast beef, for instance, requires four or five hours, or double the time.

As already noted, the potato is not rich in protein, although the amount of this element in the baked potato reaches the Chittenden standard, ten per cent of the total nutritive value. Also the proportion of fat is not high, a lack, however, which can easily be supplied. Half a pint of rich milk will thus balance a pound of baked potato; or an equally good balance may be made by adding to a pound of potato two ounces of white bread (two ordinary slices) and an ounce of butter.

We are now aware of the importance of the alkaline salts that are found in vegetables---and in a much larger proportion in the potato than in any other vegetable used as food, the potato containing nearly forty times as much of this useful element as some cereal foods. No farmer would think of feeding his horses or cattle on grain alone. Cereals of all sorts contain a considerable excess of acid-forming elements. Grass and other herbage, as well as fresh vegetables, contain an abundance of alkaline salts, and hence are a necessary part of the diet of animals. Human beings, as Bunge has clearly shown, require vegetables for the same reason, and the potato is the most valuable of all known foods as a source of these very essential elements.

Again, graham bread and butter, or beans and butter, are much better combinations with potato than meat, for the reason that both meat and potato are lacking in lime. The body requires about thirteen grains of lime a day. Meat contains but half a grain of lime to the pound. The potato contains only a grain and a half to the pound.

The potato is of vast service as a food remedy in the treatment of a large number of diseases. It is especially valuable in cases of chronic intestinal autointoxication, or "biliousness." It affords bulk for the intestines to act upon, and so combats constipation. The large proportion of starch and other carbohydrates encourages the growth of friendly bacteria in the intestines, thus preventing putrefaction. For the same reason the free use of potatoes combats rheumatism and gout, which are results of chronic intestinal poisoning.

The potato is valuable in the treatment of anemia, because it fights the growth in the intestine of the germs which produce blood-destroying poisons. The death-rate from diabetes, according to the mortality statistics of the United States Census Bureau, has increased nearly fifty per cent in ten years. The freer use of potatoes as an article of diet and the lessened consumption of meat would perhaps do more than any other thing to suppress the alarming increase of this fatal malady.

Arteriosclerosis, or hardening of the arteries, a disease which causes apoplexy and is associated with Bright's disease and various forms of heart disease, besides being the cause of premature old age, is often directly the result of chronic poisoning, the cause of which is the putrefaction of undigested remnants of animal substances that have been eaten, which undergo decay with the absorption of poisonous products. The free use of the potato as an article of diet in place of the excessive consumption of meat and fish, a practice widely prevalent, would unquestionably check the alarming rapid development of this disease, which, according to the United States mortality reports, has increased four hundred per cent in the last ten years.

The potato, buttermilk, and oatmeal diet of the Irish has developed one of the most sturdy and enduring races of men to be found

anywhere. The proportion of centenarians in Ireland is more than ten times as great as in England. There can be no doubt that the free use of potatoes by the Irish is in large measure responsible for the remarkable longevity of this nation.

The idea that the potato is hard to digest and thus gives rise to fermentation in the stomach is entirely erroneous. The fault is not with the potato, but with the manner of eating. When acted upon by the saliva, the starch of the potato is convertedinto maltose and dextrin, which are powerful stimulants of the glands that produce the stomach digestive juices.

Properly cooked and well chewed, the potato is not only a good food, but is an aid to the digestion of other foods. In persons whose stomachs have a tendency to produce excessive acids the stimulating effect to the potato may be so great as to produce the symptoms characteristice of hyperacidity, heartburn, tenderness of the stomach, regurgitation of gas and acid liquid, and other well-known symptoms. This difficulty is not at all due to fermentation, but to an excessive amount of acid and the resulting spasmodic contraction of the pylorus, so that the stomach is stimulated to violent contraction. The gas contained in the stomach cannot be forced downward in the proper direction, and so escapes upward. The difficulty is not likely to occur, however, except when chewing is not thorough, for the gastric juice has little action upon the potato. Coarse particles of potato may remain in the stomach many hours, causing excessive acid fermentation, irritation and eructations. In eating potato every morsel must be chewed until reduced to a smooth paste in which no coarse particles can be detected by the tongue.

Rhubarb a Poisonous Weed.

How amazing difficult it is to root up an established custom no matter how harmful it may be shown to be.

For about one hundred years rhubarb has been used as a sort of substitute for fruit because of its acid flavor. In general only the stems have been used. Recently the scarcity of food in England and France led to the use of the leaves as well as the stems and with the result that many persons have been made very ill,and a clergyman died. The coroner's investigation showed that the patient died of oxalic acid poisoning.

The government chemist made an analysis of the rhubarb and showed that the leaves contained 10 grains each of oxalate of potash and oxalate of lime to the pound of 20 grains of oxalic acid compound. The analyst hastened,however,to reassure the public by stating that the stems only contain half as much oxalic acid as the leaves,which means simply that one would have to take twice as much pie plant sauce made from the stems as of greens prepared from the leaves to produce fatal effects if he wished to commit suicide by swallowing oxalic acid.

Who can for a moment imagine that half a fatal dose of poison is a harmless and innocent food??

In the face of the facts it is plainly the duty of state and federal authorities to warn the public against the pieplant as a poisonous and dangerous weed that should have no place in our gardens except as a foliage plant for decorative purposes,which is the use made of it in Germany.

Rhubarb a Poisonous Weed.

How amazing difficult it is to root up an established Burdock ~~Weed~~ no matter how painful it may be.

For about one hundred years rhubarb has been used as a root of institute

for fruit because of ~~the~~
its acid flavor. In general
only the stems have been
used. Recently, the scarcity
of food ~~abroad~~ in England
and France led to the
use of the leaves as well
as the stems and with
the result that many
persons have been made ra

ill and a clergyman died.
The coroner's investigation showed
that the patient died of
oxalic acid poisoning.
The government chemist
made an ~~examination~~ analysis of the stomach and
showed that the leaves con-
tained 10 grains each of
oxalate of potash and ox-
alate of lime to the pound
of 20 grains of oxalic acid
compound. The analyst

unless however to reassure the public by stating that the stems only contain half as much oxalic ~~acid~~ acid as the leaves, which means ~~that~~ simply that one would need to take twice as much pie plant sauce made from the stems as of greens prepared from the leaves to produce fatal effects if he wished to commit suicide by

swallowing oxalic acid.

Who can for a moment imagine that half a fatal dose ~~or a~~ of poison is a harmless and innocent food?!

In the face of the facts it is really the duty of state and federal authorities to warn the public ~~to~~ ~~danger~~ against the ingredient as a danger

poisonous and dangerous
weed that should have
no place in an gardens
except as a foliage plant
for decorative purposes
which is the use made
of it in Germany.

613.2

TOASTED RYE FLAKES

Prepared from choicest grades of white rye specially cleaned and polished in our own mills, and flaked by our own patented process usued exclusively by us.

We are the originators of all toasted flake cereals. Others are imitators.

Toasted Rye Flakes are especially recommended for persons suffering from constipation.

(Copy for one side; directions and Diet System on the other)

12

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The Tlascalans Ate No Salt.

Prescott's "Conquest of Mexico" gives some interesting facts respecting a tribe of native Mexicans who at the time of the Spanish invasion were found living wholly without salt. They also made no use of either cacao or cotton. They had for some reason been deprived of the use of these articles for more than half a century. According to Prescott their taste for cacao and salt had been so thoroughly lost "that it required the lapse of several generations after the conquest to reconcile them to the use of salt at their meals." That these people were in no way damaged by abstinence from salt is shown by the following description of them, Vol. 1, page 466.

"A bold and hardy peasantry was matured among the recesses of the hills, fit equally to cultivate the land in peace and to defent it in war. Unlike the spoiled child of Nature, who derives such facilities of subsistence from her too-prodigal hand as supersede the necessity of exertion on his own part, the Tlascalan earned his bread by the sweat of his brow. He led a life of temperance and toil. Cut off by his long wars with the Aztecs from commercial intercourse, he was driven chiefly to agricultural labor, the occupation most propitious to purity of morals and sinewy strength of constitution. His honest breast glowed with the patriotism, or local attachment to the soil, which is the fruit of its diligent culture; while he was elevated by a proud consciousness of independence, the natural birthright of the child of the mountains.

Bolton and Goodhart pointed out that the curve of total chlorides is a better indicator of gastric secretion than the curve of acidity, because the acidity is neutralized more or less.

For determining the total and inorganic chlorides, they reduce the samples to ashes with and without soda and titrated by the Volhard method.

SPECIAL HEALTH VALUES OF THE SOYBEAN*

John Harvey Kellogg, M. D., LL. D., F. A. C. S., Medical Director of the Battle Creek Sanitarium, Battle Creek, Michigan, and Medical Director of the Miami-Battle Creek, Miami Springs, Florida.

The rapid development of the production and use of the soybean (*Soja hispida*) in this country within the last quarter of a century, and the multitudinous uses to which it is being put, fully justify the name "wonder bean", which it has been called by American writers, and the appellation, "little honorable plant", by which it is known in China.

In South China, the soybean so completely replaces other sources of protein that there is no dairy industry, and meat, fish and even eggs, are very little used. The soybean is the chief source of protein for the common people and is referred to as "the poor man's meat."

Studies of this most remarkable of food products, especially in the United States and Germany, have shown it to possess not only extraordinary nutrient properties, but also some highly important prophylactic and therapeutic values, knowledge of which ought to be popularized as rapidly and widely as possible.

Although botanically classed with legumes, the soybean rather closely resembles the nut in its very low content of starch and high percentage of protein. It easily takes precedence over all other natural foodstuffs in the great percentage of protein which it contains, and protein of such superior quality that in animal feeding experiments it has proved itself to be capable of replacing proteins of all other sorts, even milk proteins. The soybean protein content is 40%, nearly twice that of average meat and four times that of eggs, three to four times that of wheat and other cereals, five to six times that of bread, twice that of lima and navy beans, walnuts, filberts and most other nuts. The protein of the soybean (glycine) is of high quality, like that of milk, containing

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certain amino acids in which the proteins of nearly all other legumes and all cereals are deficient.

The oil of the soybean is also of superior excellence, containing as high a percentage of lecithin as do eggs (Schulze)[1]. Its percentage of calcium is 12 times that of wheat flour. Its ash is more highly basic than that of any other food, a quality which gives it great importance as a possible corrective of our too highly acid American diet, having, according to Engling (Becker), a basic equivalent of 24.50 mg. compared with 2.25 for human milk and 1.69 for cow's milk.

The soybean is an exceptionally excellent source of vitamins. All are present with the exception of vitamin C, the scurvy preventive, and this is abundant in beans which have been slightly sprouted. The soy is one of the few very rich sources of vitamin B, and contains 255 units of vitamin G per ounce, more than does any other plant food, a fact of much significance in view of Sherman's demonstration of the great value of this vitamin as a means of promoting health development, vigor and longevity.

Another surprising property of the soybean is its efficiency as a substitute for animal milk in infant feeding. In China, dealers in birds feed hatchlings exclusively on soybean milk, and motherless babes for centuries have been, in Oriental countries, fed on this plant milk.

In composition, as well as in appearance, soy milk has a very remarkable resemblance to animal milk. It is more like human milk than is cow's milk, containing one-half more protein than does human milk, half as much fat, an equal amount of lime, twice as much iron as does human milk, and 5 times as much as cow's milk. Its deficiency in carbohydrates is easily corrected by the addition of lactose or malt sugar.

Rottinger and Dembo[2] fed 50 infants on soybean milk and found it "a thoroughly suitable nutriment for sucklings." A Chinese investigator, Tso (Becker), successfully nourished infants from birth to the age of eight months with soybean milk and without animal food of any kind. Mader showed that soy milk is not only able to replace animal milk, but in some cases, to displace it.

The soybean has steadily grown in importance from a therapeutic point of view since Friedenwald and Rurah showed (1910) it to be valuable in the feeding of diabetics not only on account of its richness in protein, its low carbohydrate content and its palatability, but because it in some unexplained way caused "a reduction in the percentage and the total quantity" of urinary sugar in diabetic subjects[3] on the usual dietary restrictions.

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The remarkable influence of the soybean in combating secondary B. coli infections is clearly shown in a paper by Christian Becker[6], of the Pediatric Clinic of the University of Frankfort, where for several years soybean milk has been the routine treatment of kidney and bladder

infections in young children, and with results far better than have been obtained by other means.

Various authors have reported remarkable results from the feeding of soybeans or soybean milk in cases of arthritis, anemia, rickets, obesity and other morbid conditions.

Another property of the soybean which has recently come to light explains and establishes on a rational basis its value as a prophylactic measure against intestinal infections by promoting the development of a protective aciduric flora in the intestinal tract. Nearly forty years ago (1900) Dr. Tissier[7], an assistant of Pasteur, discovered in the stools of nursing infants a microorganism to which he gave the name Bacillus bifidus, now known as Lactobacillus acidophilus or bifidus-acidophilus. He observed that this organism in infants' stools two or three days after nursing began increased in numbers so rapidly that by the end of two weeks, the B. coli, Welchii, putrificus and other proteolytic organisms with which the stools of infants always become infected within a few hours after birth, had disappeared together with their offensive and toxic products.

The importance of suppressing putrefactive and pathogenic bacterial development in the intestine is strongly evidenced by the great interest shown in Metchnikoff's proposal to change the intestinal flora and the many and continuous efforts which have been made in this direction. The failure of acidophilus milk to fully meet the requirements of clinical use appears to be due to the fact noted by Tissier that dairy milk is a poor medium for this organism. Soybean milk supplies a medium which seems to be so especially adapted to the nutrient needs of the protective flora that it produces a strain or type which is much more vigorous, prolific, and hardy

than the milk grown organisms. Several able bacteriologists (Howe, Roderick, Powell) report counts per cc. two to five times as great as are found in milk cultures, with the individual organisms more than twice as large and more hardy, being less easily damaged by variations of temperature. Roderick and Howe report cultures viable for more than two years.

This rapid development of the Lactobacillus acidophilus with which the infant comes in contact in the act of nursing is due to the large percentage of lactose in human milk and gives to the contents of the infant's intestine so high a degree of acidity that the growth of putrefactive organisms is inhibited. This is evidently a provision of Nature for the protection of the body against invasion of the alimentary tract by putrefactive and pathogenic bacteria and probably also other parasitic microorganisms which require an alkaline medium.

The experience of the quintuplets, reported by Dr. Dafoe in an interesting medical paper[8], affords an excellent illustration of the remarkable influence of the soybean in controlling intestinal infection. Through the extraordinary circumstances of their birth, the quintuplets had no opportunity to have implanted in their intestines the protective Lactobacillus acidophilus which infants normally acquire by contact with the maternal breast. Notwithstanding the fact that they were fed on breast milk exclusively from their births, and in spite of the use of most extraordinary protective measures taken to prevent infection, they suffered at the age of four months a very severe attack of bowel trouble which baffled the consummate skill of their physician until he added to their food, soybean milk cultures of the Lactobacillus acidophilus. Improvement began at once. In a few days the stools were normal and by the continued use of the soy milk culture, the quintuplets have been kept free from bowel troubles since, except for brief

periods when its use has been interrupted. A well developed aciduric flora is maintained, the percentage of Lactobacillus acidophilus having increased from 20 to 85.

The experience of Dr. Dafoe and extensive laboratory studies have clearly shown the importance of the soybean as a means of developing and maintaining in the intestine a protective aciduric bacterial flora and this fact affords a rational basis for its therapeutic use in the several classes of disorders in which clinicians have found it to be highly efficient, even when other measures have failed. Here also may be found an explanation of the great role which this extraordinary food product has played in the sustenance of the Chinese during more than a hundred generations of well-sustained national vigor and physical development under conditions of sanitation which expose them to intestinal infections to an unusual degree.

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the national bill of fare. A few years ago (1923), Dr. Arthur Hunter, Chief Actuary of the New York Life Insurance Company, in an international study of blood pressures, found the systolic pressure of the average Chinaman to be ten points lower than that of the average American andgave conclusive evidence that the cause is to be found in the difference in the dietary habits of the Chinese and Americans. In concluding an address before the American Life Underwriter's Association, Dr. Hunter said, "Taking the population of the United States as a whole, I believe that a better adjusted diet, with less animal food, would result in a lower blood pressure and in greater longevity with an equal ability to carry on their occupations."[9]

In view of the facts cited in this paper, is it not reasonable to believe that the general use of the soybean in this country would tend to lessen the mortality rate from intestinal infections and many other acute and chronic disorders, and to increase individual life expectation?

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5. Sinclair, N. Y. State Jour. Med., 16, 1916, No. 2:83-88.
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SOY ACIDOPHILUS MILK

A HIGHLY POTENT CULTURE OF A NEW TYPE OF LACTOBACILLUS ACIDOPHILUS FOR CHANGING THE INTESTINAL FLORA

More than 40 years ago, Bouchard of Paris demonstrated the pathogenic character of the intestinal flora and the toxicity of its product. Herter of New York some years later confirmed the observations of Bouchard and added important facts in relation to the pernicious influence of Cl. Welchii, B. coli, B. putrificus, B. sporogenes and other putrefactive organisms.

ORIGIN OF THE IDEA

Quinck, a pupil of Metchnikoff, the eminent biologist of the Pasteur Institute, who discovered phagocytosis and the defensive function of the leucocytes, conceived the idea of combating intestinal infections by the implantation of an organism antagonistic to parasitic and pathogenic bacteria, but harmless to the body. Metchnikoff recognized the value of the suggestion and set out to find the beneficent bacillus. He believed he had proved experimentally that the bacillus Bulgaricus, discovered by another of his assistants, Dr. Tissier, in yougurt, a buttermilk used extensively in the Orient from prehistoric times, could be implanted in the human intestine.

WHY BACILLUS BULGARICUS FAILED

The Lactobacillus Bulgaricus was exploited by a nephew of Metchnikoff under the name Lacto-Bacilline, which was in great vogue for a number of years and apparently was in many cases beneficial, but it was finally discredited through the demonstration by Rettger and others of the fact that this organism could not be implanted in the colon and that it rarely if ever survived in the alimentary tract at a lower level than the duodenum.

DISCOVERY OF LACTOBACILLUS ACIDOPHILUS

THE NATURAL PROTECTIVE ORGANISM OF THE INTESTINAL TRACT

In 1900 a new lactic acid-forming organism was discovered in the stools of nursing infants by Dr. Tissier which because of its form was named Lactobacillus bifidus. Tissier noted that the stools of new-born infants, at first wholly free from bacteria, within a few hours are swarming with B. coli, B. Welchii, streptococci and other organisms ordinarily found in fecal discharges. He discovered that a day or two after the infant begins to nurse, a new organism appears and B. coli and other organisms begin at once to diminish in numbers and within two weeks disappear, the intestinal flora consisting thereafter almost exclusively of the Lactobacillus bifidus.

About the same time Moro discovered in the stools of both infants and adults a Lactobacillus which he called acidophilus. This organism closely resembles Lactobacillus Bulgaricus in appearance, but differs from it in the fact that it is indigenous to the colon. The Lactobacillus bifidus and Lactobacillus acidophilus were many years later shown to be identical, differing morphologically under the influence of different nutrients.

THE FIRST THERAPEUTIC USE OF LACTOBACILLUS ACIDOPHILUS IN THE UNITED STATES

The new organism was first used therapeutically in this country by Kellogg through cultures obtained from the Pasteur Institute through Dr. Tissier then acting as consulting bacteriologist of the Battle Creek Sanitarium. It has since been continuously and extensively used in that institution and also in state hospitals and has proved itself of very great service in combating colitis and various forms of intestinal and digestive disorders and as a means of suppressing intestinal putrefactions through changing the intestinal flora. Our records show that between 1912 and the present time, 1937, our laboratories have supplied to hospitals and private physicians more than 1,500,000 quarter liters (the usual dose) of whey milk cultures of acidophilus. It was not, however, until publication of papers by Rettger of Yale in 1922 and later that this remarkable organism was brought to the attention of the profession in this country.

CRUICKSHANK'S DEMONSTRATION OF CHANGE OF THE FLORA IN VITRO

A few years later, Cruickshank of Aberdeen, Scotland, demonstrated experimentally that under proper lactose feeding, acidophilus will cause the rapid disappearance of Cl. Welchii, B. coli and all putrefactive and pathogenic organisms in vitro. His experiment consisted in adding two grams of fresh feces to a pint of milk in a flask which was then placed in an incubator. When examined at the end of two weeks, the contents of the flask were found to be a pure culture of Lactobacillus acidophilus. All other organisms had disappeared. This experiment clearly demonstrates the potency of this organism as a means of suppressing pathogenic and putrefactive bacteria when employed with the proper technic.

THE DISCOVERY OF A NEW TYPE OF LACTOBACILLUS ACIDOPHILUS - SOY ACIDOPHILUS

In a research undertaken in the bacteriological laboratory of Battle Creek College to determine the influence of common foodstuffs upon the growth and development of the Lactobacillus acidophilus, the discovery was made that when grown in soy milk, a new and much more vigorous type of Lactobacillus acidophilus is produced. This new type has been studied by a number of able bacteriologists, among whom may be mentioned Dr. Carroll Grant, Professor of Bacteriology of Brooklyn College, Brooklyn, N. Y., formerly assistant to the eminent bacteriologist Professor Rettger of Yale University, Roderick, Howe, and others, all of whom noted with surprise the extraordinarily rapid growth, the high count and the very large size of the individual organisms, more than double the size shown in dairy milk

cultures (see micro-photograph).

SOY ACIDOPHILUS SHOWS MUCH HIGHER COUNTS THAN ACIDOPHILUS MILK

Powell, formerly local bacteriologist for the Florida State Board of Health, after a careful study of the Lactobacillus acidophilus, reported as follows:

"Experimental studies of the relative production of acidophilus bacilli using soy bean emulsion and whole cow's milk as comparative medias show that the emulsion will produce an average of five times the number of viable organisms that is produced by whole cow's milk under identical conditions.

"The organisms produced by the soy bean milk emulsion stain more readily and deeper than the organisms grown in cow's milk.

"Two strains of B. acidophilus were used, both medias were inoculated with 0.1.c.c. of a broth culture and incubated at 37.5 C. The cultures were compared at the end of forty-eight and seventy-two hours. Twenty cultures were made in each media.

"O. K. Powell."

THE PROPHYLACTIC AND THERAPEUTIC VALUE OF THE SOY ACIDOPHILUS IS WELL ESTABLISHED

The Lactobacillus acidophilus has clearly shown its ability to combat putrefactive and pathogenic bacteria both in a laboratory flask and in the colon. It is the implacable enemy of harmful and destructive bacteria and if after being once implanted in the intestine of the human infant through the act of nursing, it remains dominant as seems to be the evident purpose of its implantation, intestinal infections should be almost unknown. Unfortunately this highly desirable protection is often largely or wholly lost by the dying out and degeneration of the natural protective aciduric flora of the alimentary tract. In the healthy nursing infant the percentage of acidophilus is found to be 90 to 100. When this is the case, the stools are free from rancid or offensive odor and the child remains in good health. When the infant's stools are dark and bad smelling, the percentage of acidophilus is found to be 10 to 20 per cent or even less. Sometimes the protective organism appears to be entirely absent. By the free use of soy acidophilus milk with lactose or Lacto-Dextrin feeding, the normal flora has been quickly restored in some hundreds of cases in which the normal protective flora had been lost. The remarkable vigor of growth characteristic of the soy acidophilus organism makes it a thoroughly dependable means of changing the flora in cases in which other measures have failed.

SOY ACIDOPHILUS CONTRASTED WITH DAIRY MILK ACIDOPHILUS

The accompanying micro-photographs, made with the same degree of magnification, clearly indicate the difference in size and vigor of growth between the dairy milk type and the soy type of acidophilus.

FIG. 1

A culture of the Lactobacillus acidophilus grown in cow's milk.

Length of individual bacilli 8 microns.

FIG. 2

A culture of the Lactobacillus acidophilus grown in milk prepared from the soy bean.

Length of individual bacilli 16 microns.

DAIRY MILK NOT A GOOD CULTURE MEDIUM FOR ACIDOPHILUS

The good results sometimes following the prolonged use of potent cultures of the Lactobacillus acidophilus have clearly demonstrated the soundness of the principle involved in the teachings of Bouchard and Metchnikoff, but unfortunately the uncertainty of the results due to fluctuations in the quality of commercial acidophilus and the long time required and usual failure have discredited these products to such a degree that the committee on therapeutics of the American Medical Association has thought it necessary to withdraw its endorsement. The shortcomings of acidophilus milk are incidentally very clearly pictured in Rettger's late book, "Acidophilus."

COW'S MILK A POOR CULTURE MEDIUM FOR ACIDOPHILUS

Dr. Tissier noted many years ago (1912) that cow's milk is not a good culture medium for the Lactobacillus acidophilus. In this medium the organism grows at first so slowly that 25 or 30 transfers and several months' time are required to produce a satisfactory acidophilus milk. The lactobacillus acidophilus is adapted to an anaerobic environment. As Rettger has clearly pointed out, the long exposure of acidophilus to unnatural conditions lessens its adaptation to the environmental conditions of the colon. This renders its implantation difficult. In soy acidophilus milk the Lactobacillus acidophilus begins at once a vigorous growth. Numerous transfers and hence a long period of aerobic exposure are not required.

The individual organisms grown in soy milk are more than twice as large as those grown in cow's milk and far more numerous as shown by Powell and by every other bacteriologist who has studied the new type. (See cuts.)

THE SUPERIOR FOOD VALUE OF SOY ACIDOPHILUS MILK

The following comparative table shows in the first column the composition of soy acidophilus milk, the figures given being based upon an analysis of the milk made by Prof. Willard, Dean of the Department of Chemistry of the University of Michigan:

	Soy Acidophilus Milk	Cow's Milk	Human Milk
	Per Cent	Per Cent	Per Cent
Protein	3.60	3.30	2.01
Fat	1.52	4.00	3.7
Carbohydrates	5.00	5.00	6.4
Calcium	0.025	0.114	0.021
Iron	0.0010	.0002	.0005
Ash	0.79	0.7	0.2
Calories per ounce	13.7	19.7	19

The composition of soy acidophilus milk closely resembles that of cow's milk. It contains less lime, which is an advantage, since cow's milk contains an excess, more than three times that found in human milk, being adapted to nourish an animal that doubles the weight of its bony structure in a few weeks. The lime content of soy acidophilus milk is practically the same as that of human milk.

The iron content of soy milk (.0010) is five times as great as that of cow's milk and double that of human milk, which, in connection with its richness in vitamin A, gives it superior quality as a blood building nutrient.

The soy bean, unlike cereals, is a basic ash product, and combats acidosis. This is not true of cow's milk, which is neutral and hence does not combat acidosis. Its principal proteins are soluble in water. Its carbohydrates are chiefly pentoses instead of saccharides and hence not assimilable. Lactose is added to supply this deficiency.

Vitamin Con ents

Soy acidophilus milk, made by the Battle Creek Food Co. of Battle Creek, Mich., and the Home Milk Producers Association of Miami, Florida, is much richer in essential vitamins than is cow's milk. It contains in each quart the following vitamins:

5,000 units of vitamin A, which builds up resistance to infections.

500 units of vitamin B, which promotes growth, bowel action and digestion and prevents neuritis.

500 units of G, the anti-pellagra vitamin, which promotes growth and general nutrition and ...

500 units of vitamin D and a rich source of vitamin E.

Soy acidophilus milk so closely resembles mother's milk in its chemical composition that when necessary it may be safely substituted for it in combination with other foods in bottle feeding as was done by Dr. Dafoe in rearing the quintuplets.

Its generous supply of vitamins, more than double that of dairy milk, gives the soy acidophilus milk great value for the feeding of undernourished and feeble infants. For adults, it provides one of the best known means of insuring an abundant intake of essential vitamins. Two or three glassfuls daily will suffice to meet the daily vitamin requirement regardless of what the rest of the diet may be. A glassful of orange or grapefruit juice will adequately supply vitamin C. Florida climate supplies an abundance of the sunshine vitamin D, and vitamin E is so widely distributed in foodstuffs that there will be no lack unless it is intentionally excluded.

A glassful (6 or 8 ozs.) of soy acidophilus milk at each meal will furnish all the vitamin A ordinarily required by an adult and so insures a super abundance of this vitamin, which, according to Sherman, is advantageous in promoting super health. Rats fed an extra amount of vitamins A and G were larger, had finer fur than other rats and lived nearly three times as long. When introduced directly into the colon by enema, the beneficial results are almost immediate. Stasis is relieved and spasticity and

gas production rapidly diminish until in a few weeks they disappear. Gas is due to the activity of B. coli and Cl. Welchii. Acidophilus produces only lactic acid, a non-volatile liquid, instead of CO_2.

THE ENERGY VALUE OF SOY ACIDOPHILUS MILK

The table shows the energy value of soy acidophilus milk to be more than two-thirds that of cow's milk or human milk. This is chiefly due to the comparatively low fat content (15 per cent), which adds to its digestibility.

CLINICAL RESULTS

The most important objective in the use of soy acidophilus milk is the suppression of intestinal putrefactions. Its efficiency in combating the activity of putrefactive and pathogenic bacteria, such as B. coli, Cl. Welchii and various species of streptococci is due to the fact that it produces lactic acid and is able to tolerate a highly acid medium (one per cent or more) while the parasitic pathogenic organisms require an alkaline medium and are unable to tolerate more than a very low percentage of acidity (1/10 per cent). The Lactobacillus acidophilus produces lactic acid from lactose or dextrin, which must be used with soy acidophilus in order to secure prompt and thoroughgoing results.

Since the discovery of the soy type of acidophilus in 1933, its clinical use has developed rapidly. Its ability to make a marked change in the intestinal flora has been shown in hundreds of cases in many of which acidophilus milk had been previously used without marked results. A notable example of its efficiency is afforded by the experience of the quintuplets. At the age of four months the famous infants, in spite of the meticulous care given them by Dr. Dafoe, developed a very severe type of bowel infection. Since the fourth day after their birth they had taken no other food than mother's milk and extraordinary precautions had been taken to prevent infection from any source. Dr. Dafoe and his two nurses had worn masks. They were viewed by the thousands of strangers who visited them only from a distance or through glass and yet Dr. Dafoe reported severe bowel trouble. The infection was doubtless due to the fact that they had never had an opportunity to receive a proper implantation of the Lactobacillus acidophilus through breast feeding, the natural method by which the colon bacillus, Cl. Welchii and other organisms which invade the infant's colon immediately after birth, are driven out and their harmful effects prevented through the complete occupation of the alimentary tract by the Lactobacillus acidophilus, as discovered by Tissier. Through the use of soy acidophilus milk they were cured in a few days and since have been kept in good health by the continued use of soy acidophilus milk. Dr. Dafoe gives each of the quins a half pint of soy acidophilus milk at four o'clock every afternoon.

Soy acidophilus milk is highly efficacious in the treatment of both chronic and acute colitis. The accompanying cut shows what was accomplished in a case of colitis of long standing through the use of soy acidophilus milk by mouth and by enema within six weeks after beginning treatment, when many other measures had been employed without success.

FIG. 3

A roentgenogram of the colon of a patient who had suffered for many years from colitis. The descending and pelvic colon are in a highly spastic condition. There had been no natural evacuations for more than a year.

FIG. 4

A roentgenogram of the same colon shown in Fig. 3 after six weeks' use of Soy acidophilus milk by mouth and by enema. Within four weeks after beginning the use of soy acidophilus milk, natural evacuations occurred daily.

Soy acidophilus milk secures therapeutic results by removing the cause through displacing the pernicious bacteria and establishing a natural and harmless aciduric flora. Physicians who have had large experience in its use, both in private and hospital practice, report most gratifying results in the treatment of cases of allergy both in infants and adults, not only in cases in which the patient is sensitized to dairy milk but in non-pollen cases associated with intestinal toxemia, especially cases of asthma, skin eruptions and digestive distrubances which do not yield to an intelligent application of the measures usually employed in such cases. Dr. Walter F. Martin, the able genito-urinary specialist of the Battle Creek Sanitarium, reports success in freeing the urine from B. coli in cases of long standing which had resisted all other means in current use.

Cases of gastro-duodenitis and especially cases of duodenitis generally improve rapidly under the use of soy acidophilus milk. In cases of peptic ulcer pain disappears quickly under the use of soy acidophilus milk, and in numerous cases that have been thoroughly treated by this method, definite and permanent cures have been reported.

HOW MUCH TO TAKE

In general, a glassful of soy acidophilus should be taken at each meal. An additional glass taken at bedtime will hasten the change of flora. Children require larger doses than adults in proportion to their size. For a three year old child a half glassful of soy acidophilus milk with a large spoonful of Lacto Dextrin, taken three times a day, will effect a rapid change of flora. A much larger amount may be taken without injury. We understand that Dr. Dafoe keeps the quintuplets in good health by giving them a glassful of soy acidophilus milk every afternoon and another half pint at or between the different meals. Very small doses, one or two teaspoonfuls, mixed with the regular feeding, may give excellent results in very young children. Dr. Dafoe began its use with the quintuplets with teaspoonful doses.

It is not necessary that the soy acidophilus milk should be taken by itself; it may be mixed with ordinary milk, cream, orange or tomato juice, gruel and other liquid foods. For children who dislike acid, water, and a little sugar may be added. For very young bottle-fed infants a few teaspoonfuls of soy acidophilus milk with Lacto Dextrin may be added to the feeding bottle. All bottle-fed infants will profit greatly by its use. Beta-lactose (B-Lac) or malt sugar should be used instead of cane sugar for sweetening the feeding mixture.

THE BATTLE CREEK FOOD COMPANY

March, 1937

3-28-38

SPECIAL HEALTH VALUES OF THE SOYBEAN*

John Harvey Kellogg, M. D., LL. D., F. A. C. S., Medical Director of the Battle Creek Sanitarium, Battle Creek, Michigan, and Medical Director of the Miami-Battle Creek, Miami Springs, Florida.

The rapid development of the production and use of the soybean (*Soja hispida*) in this country within the last quarter of a century, and the multitudinous uses to which it is being put, fully justify the name "wonder bean", which it has been called by American writers, and the appellation, "little honorable plant", by which it is known in China.

In South China, the soybean so completely replaces other sources of protein that there is no dairy industry, and meat, fish and even eggs, are very little used. The soybean is the chief source of protein for the common people and is referred to as "the poor man's meat."

Studies of this most remarkable of food products, especially in the United States and Germany, have shown it to possess not only extraordinary nutrient properties, but also some highly important prophylactic and therapeutic values, knowledge of which ought to be popularized as rapidly and widely as possible.

Although botanically classed with legumes, the soybean rather closely resembles the nut in its very low content of starch and high percentage of protein. It easily takes precedence over all other natural foodstuffs in the great percentage of protein which it contains, and protein of such superior quality that in animal feeding experiments it has proved itself to be capable of replacing proteins of all other sorts, even milk proteins. The soybean protein content is 40%, nearly twice that of average meat and four times that of eggs, three to four times that of wheat and other cereals, five to six times that of bread, twice that of lima and navy beans, walnuts, filberts and most other nuts. The protein of the soybean (glycine) is of high quality, like that of milk, containing

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*Read before the Section of Food and Nutrition of the American Public Health Association at the Sixty-sixth Annual Meeting in New York City, Oct. 5, 1937.

certain amino acids in which the proteins of nearly all other legumes and all cereals are deficient.

The oil of the soybean is also of superior excellence, containing as high a percentage of lecithin as do eggs (Schulze)[1]. Its percentage of calcium is 12 times that of wheat flour. Its ash is more highly basic than that of any other food, a quality which gives it great importance as a possible corrective of our too highly acid American diet, having, according to Engling (Becker), a basic equivalent of 24.50 mg. compared with 2.25 for human milk and 1.69 for cow's milk.

The soybean is an exceptionally excellent source of vitamins. All are present with the exception of vitamin C, the scurvy preventive, and this is abundant in beans which have been slightly sprouted. The soy is one of the few very rich sources of vitamin B, and contains 255 units of vitamin G per ounce, more than does any other plant food, a fact of much significance in view of Sherman's demonstration of the great value of this vitamin as a means of promoting health development, vigor and longevity.

Another surprising property of the soybean is its efficiency as a substitute for animal milk in infant feeding. In China, dealers in birds feed hatchlings exclusively on soybean milk, and motherless babes for centuries have been, in Oriental countries, fed on this plant milk.

In composition, as well as in appearance, soy milk has a very remarkable resemblance to animal milk. It is more like human milk than is cow's milk, containing one-half more protein than does human milk, half as much fat, an equal amount of lime, twice as much iron as does human milk, and 5 times as much as cow's milk. Its deficiency in carbohydrates is easily corrected by the addition of lactose or malt sugar.

Rottinger and Dembo[2] fed 50 infants on soybean milk and found it "a thoroughly suitable nutriment for sucklings." A Chinese investigator, Tso (Becker), successfully nourished infants from birth to the age of eight months with soybean milk and without animal food of any kind. Mader showed that soy milk is not only able to replace animal milk, but in some cases, to displace it.

The soybean has steadily grown in importance from a therapeutic point of view since Friedenwald and Rurah showed (1910) it to be valuable in the feeding of diabetics not only on account of its richness in protein, its low carbohydrate content and its palatability, but because it in some unexplained way caused "a reduction in the percentage and the total quantity" of urinary sugar in diabetic subjects[3] on the usual dietary restrictions.

Rurah (1910)[4] and also Sinclair (1916)[5] found the soybean of great service as a food remedy for infants and young children suffering from summer diarrhea and infants sensitized to cow's milk.

The soybean has been shown by Becker and other clinicians to be of great value in the treatment of eczema and other skin affections. The marked acidosis which has been shown by many authors to exist in these cases is rapidly relieved by the free use of the soybean. The intense itching diminishes almost immediately, and within a few days disappears, as do later the skin lesions.

The remarkable influence of the soybean in combating secondary B. coli infections is clearly shown in a paper by Christian Becker[6], of the Pediatric Clinic of the University of Frankfort, where for several years soybean milk has been the routine treatment of kidney and bladder

infections in young children, and with results far better than have been obtained by other means.

Various authors have reported remarkable results from the feeding of soybeans or soybean milk in cases of arthritis, anemia, rickets, obesity and other morbid conditions.

Another property of the soybean which has recently come to light explains and establishes on a rational basis its value as a prophylactic measure against intestinal infections by promoting the development of a protective aciduric flora in the intestinal tract. Nearly forty years ago (1900) Dr. Tissier[7], an assistant of Pasteur, discovered in the stools of nursing infants a microorganism to which he gave the name Bacillus bifidus, now known as Lactobacillus acidophilus or bifidus-acidophilus. He observed that this organism in infants' stools two or three days after nursing began increased in numbers so rapidly that by the end of two weeks, the B. coli, Welchii, putrificus and other proteolytic organisms with which the stools of infants always become infected within a few hours after birth, had disappeared together with their offensive and toxic products.

The importance of suppressing putrefactive and pathogenic bacterial development in the intestine is strongly evidenced by the great interest shown in Metchnikoff's proposal to change the intestinal flora and the many and continuous efforts which have been made in this direction. The failure of acidophilus milk to fully meet the requirements of clinical use appears to be due to the fact noted by Tissier that dairy milk is a poor medium for this organism. Soybean milk supplies a medium which seems to be so especially adapted to the nutrient needs of the protective flora that it produces a strain or type which is much more vigorous, prolific, and hardy

than the milk grown organisms. Several able bacteriologists (Howe, Roderick, Powell) report counts per cc. two to five times as great as are found in milk cultures, with the individual organisms more than twice as large and more hardy, being less easily damaged by variations of temperature. Roderick and Howe report cultures viable for more than two years.

This rapid development of the Lactobacillus acidophilus with which the infant comes in contact in the act of nursing is due to the large percentage of lactose in human milk and gives to the contents of the infant's intestine so high a degree of acidity that the growth of putrefactive organisms is inhibited. This is evidently a provision of Nature for the protection of the body against invasion of the alimentary tract by putrefactive and pathogenic bacteria and probably also other parasitic microorganisms which require an alkaline medium.

The experience of the quintuplets, reported by Dr. Dafoe in an interesting medical paper[8], affords an excellent illustration of the remarkable influence of the soybean in controlling intestinal infection. Through the extraordinary circumstances of their birth, the quintuplets had no opportunity to have implanted in their intestines the protective Lactobacillus acidophilus which infants normally acquire by contact with the maternal breast. Notwithstanding the fact that they were fed on breast milk exclusively from their births, and in spite of the use of most extraordinary protective measures taken to prevent infection, they suffered at the age of four months a very severe attack of bowel trouble which baffled the consummate skill of their physician until he added to their food, soybean milk cultures of the Lactobacillus acidophilus. Improvement began at once. In a few days the stools were normal and by the continued use of the soy milk culture, the quintuplets have been kept free from bowel troubles since, except for brief

periods when its use has been interrupted. A well developed aciduric flora is maintained, the percentage of Lactobacillus acidophilus having increased from 20 to 85.

The experience of Dr. Dafoe and extensive laboratory studies have clearly shown the importance of the soybean as a means of developing and maintaining in the intestine a protective aciduric bacterial flora and this fact affords a rational basis for its therapeutic use in the several classes of disorders in which clinicians have found it to be highly efficient, even when other measures have failed. Here also may be found an explanation of the great role which this extraordinary food product has played in the sustenance of the Chinese during more than a hundred generations of well-sustained national vigor and physical development under conditions of sanitation which expose them to intestinal infections to an unusual degree.

The value of the soybean as a source of protein makes it one of the most important single items in our national food budget. In the face of a declining livestock industry, the United States Department of Agriculture has long recognized the need of increased plant sources of protein to ensure our growing population against national malnutrition. Most praiseworthy, though inadequate efforts, have been made to solve the problem by the planting of nut bearing trees.

Forty years ago, I was requested by Dr. Dabney, then Assistant Secretary of the United States Department of Agriculture, to prepare from plant sources a substitute for meat, and found in a combination of the gluten of wheat with peanuts a product having not only the essential nutrient values of meat, but a fairly close approximation in flavor and appearance. The soybean solves the problem so completely and so satisfactorily that with the proper development of its culture and use, there need be no fear of a protein

shortage and no need of a substitute. There is, indeed, evidence that Americans might profit greatly as the Chinese have by giving the soybean a large place in the national bill of fare. A few years ago (1923), Dr. Arthur Hunter, Chief Actuary of the New York Life Insurange Company, in an international study of blood pressures, found the systolic pressure of the average Chinaman to be ten points lower than that of the average American and gave conclusive evidence that the cause is to be found in the difference in the dietary habits of the Chinese and Americans. In concluding an address before the American Life Underwriter's Association, Dr. Hunter said, "Taking the population of the United States as a whole, I believe that a better adjusted diet, with less animal food, would result in a lower blood pressure and in greater longevity with an equal ability to carry on their occupations."[9]

In view of the facts cited in this paper, is it not reasonable to believe that the general use of the soybean in this country would tend to lessen the mortality rate from intestinal infections and many other acute and chronic disorders, and to increase individual life expectation?

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SOY ACIDOPHILUS MILK

A CULTURE OF LACTOBACILLUS ACIDOPHILUS WHICH IS RECOMMENDED FOR CHANGING THE INTESTINAL FLORA

LACTOBACILLUS ACIDOPHILUS - THE NATURAL PROTECTIVE ORGANISM OF THE INTESTINAL TRACT

In 1900 a lactic acid-forming organism was discovered in the stools of nursing infants by Dr. Tissier, of the Pasteur Institute in Paris. He named this organism Lactobacillus bifidus because of its bifid form. The stools of new-born infants at first free from bacteria, within a few hours contain many organisms - B. coli, and others. Dr. Tissier found that after the infant begins to nurse this organism appears in the stools, and the other bacteria begin to diminish in number. The intestinal flora consists thereafter almost exclusively of the Lactobacillus bifidus.

About the same time Morro discovered in the stools of both infants and adults a Lactobacillus which he called acidophilus. It resembles closely the bacillus bulgaricus which Metchnikoff tried to implant in the human intestine, but which was found unsatisfactory because it rarely survived in the alimentary tract lower than the duodenum. The Lactobacillus bifidus and the Lactobacillus acidophilus are closely related, and have the same function, that of suppressing the putrefactive bacteria of the colon.

ACIDOPHILUS IN THE UNITED STATES - USED BY DR. KELLOGG

The acidophilus organism was used therapeutically in this country by Dr. Kellogg through cultures obtained from the Pasteur Institute of Paris. Dr. Tissier was then acting as consulting bacteriologist of the Battle Creek Sanitarium. Acidophilus therapy has been used continuously and extensively in this institution and in Miami-Battle Creek in Miami Springs, Florida, and has proved beneficial in many cases in which digestive and intestinal disorders indicate that a change of intestinal flora is advisable. Later, Rettger of Yale (1922) brought the acidophilus organism as a therapeutic measure to the attention of the medical profession in this country. A few years later, Cruikshank of Aberdeen, Scotland, demonstrated experimentally that under proper lactose feeding, acidophilus will cause the rapid disappearance of Cl. Welchii and B. coli and other putrefactive organism from the colon.

WHAT IS SOY ACIDOPHILUS MILK?

Soy Acidophilus Milk is the milk-like emulsion of the soy bean (also called soya bean) to which a culture of the Lactobacillus acidophilus has been added. The beans are soaked, ground, and water is added to the mixture. This plant milk is then sterilized and inoculated with the culture. O. K. Powell, bacteriologist of Miami, Florida reports:

"Experimental studies of the relative production of acidophilus bacilli using soy bean emulsion and whole cow's milk as comparative medias show that the emulsion will produce an average of five times the number of viable organisms than is produced by whole cow's milk under identical conditions." Mr. Powell was formerly local bacteriologist for the State of Florida, and now has a private laboratory in Miami. There is sufficient clinical evidence to support the statement that a sufficient number of the organisms reach the colon in viable state, and in sufficient numbers to effect a change in the intestinal flora. Acidophilus therapy has been discredited as a means of changing the intestinal flora by many physicians chiefly because of the large numbers of worthless acidophilus preparations that have flooded the market. Soy Acidophilus Milk, though relatively new, has been used by Dr. Kellogg and others for several years with gratifying results. The plant milk seems to be the best medium for the growth and viability of this Lactobacillus which has been found up to this time. Bond, of the Battle Creek Food Company laboratory, Howe of Miami-Battle Creek, Powell and others have done extensive work on Soy Acidophilus Milk.

WHAT IS THE COMPOSITION OF SOY ACIDOPHILUS MILK?

The composition of Soy Acidophilus Milk is determined somewhat by the kind of bean that is used and by the composition of the water used in its preparation. Soy Acidophilus is similar to cow's milk in its percentage composition. It contains less lime, which is an advantage, since cow's milk contains more than that contained in human milk, being adapted to nourish an animal that doubles the weight of its body structure in a few weeks. The lime content of Soy Acidophilus Milk is about the same as that of mother's milk. The iron content of Soy Milk is greater than that of cow's milk or mother's milk. The milk is basic in reaction. The principal protein of the soy bean is glycinin. Fat present is the natural oil found in the soy bean. The carbohydrates of the soy bean are chiefly pentoses instead of saccharids and hence not assimilable. Lactose (3% or less) is added to supply the deficiency.

Soy Milk so closely resembles mother's milk in its chemical composition that when necessary it may be safely substituted for it in combination with other foods in bottle feeding.

PERCENTAGE COMPOSITION OF SOY ACIDOPHILUS MILK

Battle Creek Food Company Soy Acidophilus Milk, according to H. H. Willard, University of Michigan, Ann Arbor, Mich. January 1937 (Composition variable for reasons given previously.)

Specific Gravity		1.006
Protein (per cent)		2.65
Oil	"	.835
Calcium	"	.0255
Iron	"	.0017
Ash	"	.8867
Lactic Acid	"	1.01
Lactose (added)	"	2.63
Moisture		90.

Good source of vitamins A, B, and G.

Calories per ounce - 10.
Range of bacterial count of milk freshly made - 500,000,000 to 2,000,000,000 Lactobacilli per cubic centimeter.

IN WHAT CONDITIONS IS SOY ACIDOPHILUS MILK INDICATED? - HOW DOES IT SECURE THERAPEUTIC RESULTS?

Soy Acidophilus Milk is produced especially for use in treating intestinal disorders. Cases of gastro-duodenitis and duodenitis frequently improve rapidly with the ingestion of Soy Acidophilus Milk. It is efficacious in the treatment of acute and chronic colitis. It is often helpful in overcoming stubborn constipation. The most important objective in the use of Soy Acidophilus Milk is the suppression of putrefaction in the intestine. Its efficiency in combating the activity of putrefactive and pathogenic bacteria, such as Cl. Welchii, B. coli and various species of streptococci is due to the fact that it produces lactic acid and is able to tolerate a highly acid medium (one per cent or more) while the parasitic pathogenic organisms require an alkaline medium and are unable to tolerate a very low percentage of acidity. The Lactobacillus produces lactic acid from lactose, which should be taken with Soy Acidophilus Milk for best results.

Soy Acidophilus Milk secures therapeutic results by displacing the pernicious bacteria and establishing a natural and harmless type of aciduric flora. Physicians who have had experience in the use of Soy Acidophilus Milk report grati-

fying results in the treatment of allergy cases both in infants and adults. The plant milk is not only useful in cases in which the patient is sensitized to dairy milk but in allergic cases associated with intestinal toxemia, (especially in cases of asthma), skin eruptions and digestive disturbances which do not yield to an intelligent application of the measures usually employed in such cases. Success has been reported in some cases in freeing the urine of B. coli in cases of long standing which have resisted all other means of treatment in current use.

HOW MUCH SOY ACIDOPHILUS MILK SHOULD BE TAKEN? - USE OF LACTO DEXTRIN AND KABA

In general, in cases in which Soy Acidophilus Milk is indicated, a glassful of the milk should be taken at each meal. An additional glassful taken at bedtime will hasten the change of flora. You remember that lactose furnishes food for the growth of the Lactobacillus acidophilus. Lacto Dextrin is excellent for this purpose, and should be taken with Soy Acidophilus Milk for best results. It may be taken according to directions on the package, or added to each glassful of Soy Acidophilus in the proportion of one heaping tablespoonful to each glass of the milk. (Seven ounce glass referred to). Very ripe bananas, honey, potatoes, fresh fruits and cereals help to feed the friendly bacteria. Kaba, which supplies bulk-in a bland and non-irritating form may be used in connection with Soy Acidophilus Milk to encourage normal bowel movement. One teaspoonful of Kaba may be taken three times daily - allow it to stand in ½ to 1 glassful of water until soft and jelly-like in consistency.

CAN SOY ACIDOPHILUS BE GIVEN TO CHILDREN?

Children require larger amounts of Soy Acidophilus Milk than do adults in proportion to their size. For a three year old child a half glassful of Soy Acidophilus Milk with a large teaspoonful of Lacto Dextrin added, taken three times daily will effect a rapid change of flora. The "famous five" in Canada have eighteen pints of Soy Acidophilus Milk weekly divided among them. They have had the milk since they were four months old, and the amount has been increased gradually.

DOES SOY ACIDOPHILUS HAVE TO BE TAKEN PLAIN? DOES IT KEEP?

Soy Acidophilus looks and tastes somewhat like ordinary buttermilk. It may be taken plain or if preferred it may be mixed with tomato juice, pineapple or orange juice. For those individuals who are not allergic to milk and milk products Soy Acidophilus may be mixed with cream or milk. Soy Acidophilus Milk keeps best at a temperature range of 50 to 60 degrees Fahrenheit. It can usually be kept quite satisfactorily in the ordinary refrigerator for ten days to two weeks with very little change in texture or flavor, and with no apparent damage to the Lactobacillus acidophilus.

WHAT KIND OF DIET SHOULD BE FOLLOWED WHILE TAKING SOY ACIDOPHILUS MILK?

The diet should be adequate and nourishing, and should be balanced for all of the essential food principles. It should be laxative and antitoxic. Fruits, fruit juices, green vegetables, potatoes, a moderate amount of whole grain cereals, milk, cream and butter should be included in each day's menus. Protein can be assured by the use of nuts, cottage cheese, soybeans, milk and eggs. In cases of colitis, gastric or duodenal ulcer, hyperacidity, hypoacidity, etc., the diet must be regulated according to these conditions. The physician should always be consulted about the use of a particular diet when there is any pathological condition present. We shall be very glad to send information about Soy Acidophilus Milk and samples to physicians who are interested in this therapeutic food.

In many cases it may be advisable to start Soy Acidophilus Milk treatment with ½ to 1 glassful daily and increase the amount gradually until the full amount is being taken. Distressing gas which may cause discomfort usually disappears as

the intestinal flora is changed. The time required to change the flora depends upon the individual and upon the case. Soy Acidophilus may be used in enemas, in the proportion of 1 pint of Soy Acidophilus Milk to 1 pint of water.

CAN SOY ACIDOPHILUS MILK BE USED IN COOKING?

Soy Acidophilus may be used in cooking, in recipes which call for buttermilk. Cooking of course kills the protective Lactobacillus acidophilus organism, and the milk is practically useless for changing the intestinal flora when used in this manner. It may also be used in making ice cream or milk sherbet, but the organism is likewise destroyed by the freezing process. Soy Acidophilus Milk supplies additional food value to the restricted diet, and may be used in the preparation of foods for diabetic individuals and for those who are allergic to dairy milk.

HOW MAY SOY ACIDOPHILUS MILK BE OBTAINED? WHAT IS THE PRICE?

Soy Acidophilus is sent direct from the factory, priced at 25¢ per pint or $2.75 per dozen, packed six pints to the case. The milk may also be made in the home, using Battle Creek Acidophilus Culture with our Condensed Sweet Soy Milk in cans. The Culture sells for $1 per four ounce bottle, and Sweet Soy Milk at 25¢ per can. One bottle of culture is sufficient for use with twelve cans of milk. Directions for making milk in the home are furnished. All prices quoted are f.o.b. Battle Creek. It is usually more satisfactory to order Soy Acidophilus ready for use except where transportation charges increase the cost of the milk to a prohibitive amount.

Soy Acidophilus Milk is produced in Miami, Florida by the Miami Home Milk Producers Association, under license of the Battle Creek Food Company, for local distribution.

SPECIAL HEALTH VALUES OF THE SOYBEAN

SPECIAL HEALTH VALUES OF THE SOYBEAN*

John Harvey Kellogg, M. D., LL. D., F. A. C. S., Medical Director of the Battle Creek Sanitarium, Battle Creek, Michigan, and Medical Director of the Miami-Battle Creek, Miami Springs, Florida.

The rapid development of the production and use of the soybean (Soja hispida) in this country within the last quarter of a century, and the multitudinous uses to which it is being put, fully justify the name "wonder bean," which it has been called by American writers, and the appellation, "little honorable plant," by which it is known in China.

In South China, the soybean so completely replaces other sources of protein that there is no dairy industry, and meat, fish and even eggs, are very little used. The soybean is the chief source of protein for the common people and is referred to as "the poor man's meat."

Studies of this most remarkable of food products, especially in the United States and Germany, have shown it to possess not only extra-ordinary nutrient properties, but also some highly important prophylactic and therapeutic values, knowledge of which ought to be popularized as rapidly and widely as possible.

Although botanically classed with legumes, the soybean rather closely resembles the nut in its very low content of starch and high percentage of protein. It easily takes precedence over all other natural foodstuffs in the great percentage of protein which it contains, and protein of such superior quality that in animal feeding experiments it has proved itself to be capable of replacing proteins of all other sorts, even milk proteins. The soybean protein content is 40%, nearly twice that of average meat and four times that of eggs, three to four times that of wheat and other cereals, five to six times that of bread, twice that of lima and navy beans, walnuts, filberts and most other nuts. The protein of the soybean (glycine) is of high quality, like that of milk, containing certain amino acids in which the proteins of nearly all other legumes

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*Read before the Section of Food and Nutrition of the American Public Health Association at the Sixty-sixth Annual Meeting in New York City, October 5, 1937.

and all cereals are deficient.

The soybean contains as high a percentage of lecithin as do eggs (Schulze)[1]. Its percentage of calcium is 12 times that of wheat flour. Its ash is more highly basic than that of any other food, a quality which gives it great importance as a possible corrective of our too highly acid American diet, having, according to Engling (Becker), a basic equivalent of 24.50 mg. compared with 2.25 for human milk and 1.69 for cow's milk.

The soybean is an exceptionally excellent source of vitamins. All are present with the exception of vitamin C, the scurvy preventive, and this is abundant in beans which have been slightly sprouted. The soy is one of the few very rich sources of vitamin B, and contains 255 units of vitamin G per ounce, more than does any other plant food, a fact of much significance in view of Sherman's demonstration of the great value of this vitamin as a means of promoting health development, vigor and longevity.

Another surprising property of the soybean is its efficiency as a substitute for animal milk in infant feeding. In China, dealers in birds feed hatchlings exclusively on soybean milk, and motherless babes for centuries have been, in Oriental countries, fed on this plant milk.

In composition, as well as in appearance, soy milk has a very remarkable resemblance to animal milk. It is more like human milk than is cow's milk, containing one-half more protein than does human milk, half as much fat, an equal amount of lime, twice as much iron as does human milk, and 5 times as much as cow's milk, Its deficiency in carbohydrates is easily corrected by the addition of lactose or malt sugar.

Rittinger and Dembo[2] fed 50 infants on soybean milk and found it "a thoroughly suitable nutriment for sucklings." A Chinese investigator, Tao (Becker), successfully nourished infants from birth to the age of eight months with soybean milk and without animal food of any kind. Mader showed that soy milk is not only able to replace animal milk, but in some cases, to displace it.

The soybean has steadily grown in importance from a therapeutic point of view since Friedenwald and Rurdh showed (1910) it to be valuable in the feeding of diabetics not only on account of its richness in protein, its low carbohydrate content and its palatability, but because it in some unexplained way caused "a reduction in the percentage and the total quantity" of urinary sugar in diabetic subjects[3] on the usual dietary restrictions.

Rurdh (1910)[4] and also Sinclair (1916)[5] found the soybean of great service as a food remedy for infants and young children suffering from summer diarrhea and infants sensitized to cow's milk.

The soybean has been shown by Becker and other clinicians to be of great value in the treatment of eczema and other skin affections. The marked acidosis which has been shown by many authors to exist in these cases is rapidly relieved by the free use of the soybean. The intense itching diminishes almost immediately, and within a few days disappears, as do later the skin lesions.

The remarkable influence of the soybean in combating secondary B. coli infections is clearly shown in a paper by Christian Becker[6], of the Pediatric Clinic of the University of Frankfort, where for several years soybean milk has been the routine treatment of kidney and bladder infections in young children, and with results far better than have been obtained by other means.

Various authors have reported remarkable results from the feeding of soybeans or soybean milk in cases of arthritis, anemia, rickets, obesity and other morbid conditions.

Another property of the soybean which has recently come to light explains and establishes on a rational basis its value as a prophylactic measure against intestinal infections by promoting the development of a protective aciduric flora in the intestinal tract. Nearly forty years ago (1900) Dr. Tissier[7], an assistant of Pasteur, discovered in the stools of nursing infants a microorganism to which he gave the name Bacillus bifidus, now known as Lactobacillus acidophilus or bifidus-acidophilus. He observed that this organism in infants' stools two or three days after nursing began increased in numbers so rapidly that by the end of two weeks, the B. coli, Welchii, putrificus and other proteolytic organisms with which the stools of infants always become infected within a few hours after birth, had disappeared together with their offensive and toxic products.

The importance of suppressing putrefactive and pathogenic bacterial development in the intestine is strongly evidenced by the great interest shown in Metchnikoff's proposal to change the intestinal flora and the many and continuous efforts which have been made in this direction. The failure of acidophilus milk to fully meet the requirements of clinical use appears to be due to the fact noted by Tissier that dairy milk is a poor medium for this organism. Soybean milk supplies a medium which seems to be so especially adapted to the nutrient needs of the protective flora that it produces a strain or type which is much more vigorous, prolific, and hardy than the milk grown organisms. Several able bacteriologists (Howe, Roderick, Powell) report counts per cc. two to five times as great as are found in milk cultures, with the individual organisms more than twice as large and more hardy, being less easily damaged by variations of temperature. Roderick and Howe report cultures viable for more than two years.

This rapid development of the Lactobacillus acidophilus with which the infant comes in contact in the act of nursing is due to the large percentage of lactose in human milk and gives to the contents of the infant's intestine so high a degree of acidity that the growth of putrefactive organisms is inhibited. This is evidently a provision of Nature for the protection of the body against invasion of the alimentary tract by putrefactive and pathogenic bacteria and probably also other parasitic microorganisms which require an alkaline medium.

The experience of the quintuplets, reported by Dr. Dafoe in an interesting medical paper[8], affords an excellent illustration of the remarkable influence of the soybean in controlling intestinal infection. Through the extraordinary circumstances of their birth, the quintuplets had no opportunity to have implanted in their intestines the protective Lactobacillus acidophilus which infants normally acquire by contact with the maternal breast. Notwithstanding the fact that they were fed on breast milk exclusively from their births, and in spite of the use of most extraordinary protective measures taken to prevent infection, they suffered at the age of four months a very severe attack of bowel trouble which baffled the consummate skill of their physician until he added to their food, soybean milk cultures of the Lactobacillus acidophilus. Improvement began at once. In a few days the stools were normal and by the continued use of the soy milk culture, the quintuplets have been kept free from bowel troubles since, except for brief periods when its use has been interrupted. A well developed aciduric flora is maintained, the percentage of Lactobacillus acidophilus having increased from 20 to 85.

The experience of Dr. Dafoe and extensive laboratory studies have clearly shown the importance of the soybean as a means of developing and maintaining in the intestine a protective aciduric bacterial flora and this fact affords a rational basis for its therapeutic use in the several classes of disorders in which clinicians have found it to be highly efficient, even when other measures have failed. Here also may be found an explanation of the great role which this extraordinary food product has played in the sustenance of the Chinese during more than a hundred generations of well-sustained national vigor and physical development under conditions of sanitation which expose them to intestinal infections to an unusual degree.

The value of the soybean as a source of protein makes it one of the most important single items in our national food budget. In the face of a declining livestock industry, the United States Department of Agriculture has long recognized the need of increased plant sources of protein to ensure our growing population against national malnutrition. Most praiseworthy, though inadequate efforts, have been made to solve the problem by the planting of nut bearing trees.

Forty years ago, I was requested by Dr. Dabney, then Assistant Secretary of the United States Department of Agriculture, to prepare from plant sources a substitute for meat, and found in a combination of the gluten of wheat with peanuts a product having not only the essential nutrient values of meat, but a fairly close approximation in flavor and appearance. The soybean solves the problem so completely and so satisfactorily that with the proper development of its culture and use, there need be no fear of a protein shortage and no need of a substitute. There is, indeed, evidence that Americans might profit greatly as the Chinese have done by giving the soybean a large place in

the national bill of fare. A few years ago (1923), Dr. Arthur Hunter, Chief Actuary of the New York Life Insurance Company, in an international study of blood pressures, found the systolic pressure of the average Chinaman to be ten points lower than that of the average American andgave conclusive evidence that the cause is to be found in the difference in the dietary habits of the Chinese and Americans. In concluding an address before the American Life Underwriter's Association, Dr. Hunter said, "Taking the population of the United States as a whole, I believe that a better adjusted diet, with less animal food, would result in a lower blood pressure and in greater longevity with an equal ability to carry on their occupations."[9]

In view of the facts cited in this paper, is it not reasonable to believe that the general use of the soybean in this country would tend to lessen the mortality rate from intestinal infections and many other acute and chronic disorders, and to increase individual life expectation?

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FULL SOYA IN THE SOLDIER'S DIET

The considerable importance of the soya bean as a nutrient has been known in Europe for several decades, while in the Far East it has been one of the most important foodstuffs for at least 5,000 years. It was Professor Haberlandt of Vienna who, in 1872, pointed out how intensive a foodstuff the soya bean is, but it was not until the beginning of the 20th century that the European oil industry consumed soya beans in ever increasing quantities. German factories were among the leading in the field of soya bean fat extraction. However, this way of using the soya bean is by no means the most economical because the soya bean contains only 16 percent fat, but 36 percent protein. It is, therefore, rather a protein than an oil food.

Protein is irreplaceable in our food. It is, therefore, important that the protein residues, which the extraction process yields, are not simply wasted. These protein residues are contained in the soya bean meal, and soya bean meal is exclusively used as feed. The available protein, therefore, is used in human nutrition only indirectly by way of the livestock industry. This indirect method, however, entails a considerable waste, since only 10 percent of the available protein, if used for feeding, becomes ultimately available.

A new method of utilizing soya beans, which has been practised for about 15 years in Germany as well as in other countries, is of the utmost importance in the effort to use soya beans not only for their oil content but for their entire nutritive value. The soya bean by simple cooking methods cannot be prepared in a way acceptable to European taste. This is why various scientists, such as Berczeller, Kupelwieser and

others, devised the methods for milling and extracting the bitter substance from the soya bean in its original condition. The yellow flour which results from this process contains about 40 percent protein, 20 percent fat (1 to 3 percent lecithin), 27 percent carbohydrates, 5 percent ash and 8 percent water. This flour is called full soya or pure soya.

This soya bean flour has no affinity to our ordinary cereal flours. It differs from them both in its chemical composition (grain flour has from 11 to 12 percent protein, almost no fat, but 68 to 69 percent carbohydrates) and in its baking properties (grain flour has a high gluten content, full soya has no gluten at all). There is more similarity between full soya and our domestic legume flours, but full soya exceeds the latter considerably, both quantitatively and qualitatively, in respect of protein and fat content.

In fact, full soya can only be compared with livestock products, over which it has considerable superiority, however, as a result of its very low water content. (Soya bean flour 8 percent, meat 65 to 80 percent, milk 87 percent, eggs 74 percent.) 1 kilogram of full soya is equivalent, as regards protein and fat content, to 2½ kilograms of beef, or 7½ litres of full milk, or 54 chicken eggs. Full soya is used only as an ingredient for the nutritive improvement of various foodstuffs and dishes, and is never used exclusively for the preparation of a dish. Soya bean flour is a vegetable product and, therefore, costs much less than the livestock products which it replaces.

Full soya is also important as an ingredient the utilization of which makes it possible to economize in fats. It appears that a very large share of our total fat consumption is not due to human nutritive requirements for fats, but rather to factors of taste and technique in preparation of dishes. It has been shown that in regard to these factors of taste and preparing technique, the utilization of fats which are thinly and evenly distributed produce the same effects as much larger quantities less effectively distributed. The fat content in full soya flour is particularly effectively and thinly distributed, and considerable economy in fats should be possible in the case of dishes to which soya bean flour is added.

These considerations and experiences are being made full use of by the fighting forces. The discoveries in regard to the utilization of full soya flour have been partly made by men in the supply services of the army. The utilization of soya bean flour in our army is particularly important in view of the fact that soya bean production has a secure basis within Germany's reach. The army, in conjunction with the Ministry of Agriculture, has actively promoted domestic soya bean growing within the frontiers of previous Germany, in Austria, and more recently also in the Polish districts. Moreover, soya bean growing by the German Dye Trust in Balkan countries, particularly Rumania, has assured a current supply which by far exceeds the largest possible requirements of the fighting services.

As has been pointed out by Dr. Ziegelmayer, the army's preference for full soya is not only based upon the considerations which have

previously been pointed out, but also upon specific military considerations. In this connection, the low water content of full soya and its extraordinary keeping quality are important. No special methods of preservation are required in storing full soya. The product is being used in the army, firstly, in the field kitchens, secondly, as an addition to industrially produced foods and, thirdly, in the preparation of new types of foodstuffs to be used for certain purposes. Full soya has already been used before the war in the field kitchens. In September 1938 a collection of 262 recipes for field kitchens was issued. The utilization of full soya in the field kitchens has made it possible to economize in various ways. In the case of minced meat dishes, there was a saving of 25 percent of the quantity of meat previously used, although the meat portions were increased by from 25 to 45 percent. Furthermore, eggs have largely been replaced by full soya bean flour. Milk in the preparation of dishes is largely being replaced by a mixture of 1 to 10 full soya bean flour and water. Full soya is also added to cheese with low fat content and used as cooking fat in the field kitchens. It is possible, in particular, to economize in fat for liquid dishes as a result of an addition of soya bean flour. Actual fat saving in this case is estimated at 40 percent.

In the case of industrially produced foodstuffs, the army authorities have ordered the utilization of full soya, particularly in the case of tinned soup. Soya bean flour is also used for mixed cocoa drinks, biscuits and chocolate. Additions are also made in the case of tinned liver sausage, etc.

Full soya bean flour has also played an important part in the development of new foods, such as certain soups, sweets, vegetable cutlets, etc. It is generally realized in army circles that the work they have been doing in regard to the utilization of soya bean flour is not only important for the supply of the fighting forces but also as a pointer for civilian consumption in times of peace.

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Translation of an article by Dr. H. Weiss, Berlin, taken from "Die Landware," May 10, 1940.

Received from Herschel V. Johnson, Counselor of the Embassy, London, June 18, 1940.

Abstract of paper by Dr. John Harvey Kellogg, M. D., LL. D., P.S., Medical Director of the Battle Creek Sanitarium, Battle Creek, Michigan.

SPECIAL HEALTH VALUES OF THE SOYBEAN

The soybean is a richer source of nutrients than any other edible product. In South China there is no dairy industry. The soybean almost completely replaces meat, fish, poultry and eggs. It contains twice as much protein as average meat, fish, poultry and eggs. It contains twice as much protein as average meat, four times that of eggs and twice that of lima beans. Its protein is much superior to that of cereals, practically equal in quality to that of meat, milk and eggs.

The fat of the soybean is of very superior quality and is rich in lecithin.

The soybean is unique among food seeds in its richness in vitamins. Its ash is more basic than that of any other natural food substance.

A vegetable milk prepared from the soybean may take the place of cow's milk in the feeding of infants.

The soybean has proved of great service in the treatment of diabetes, rheumatism, asthma, colitis, and infection of the urinary passages and especially gastric and intestinal disorders. When used freely, it encourages the development of an aciduric flora and when planted in a milk prepared from the soybean, produces a new and extraordinarily active and hardy type of the bacillus acidophilus, by the free use of which the intestinal flora may be readily changed and reimplanted when it has been lost.

If made a great food staple in this country as it has been for some thousands of years in the Orient, the soybean should correct the prevailing acidosis due to our excessive use of cereals and meats,

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suppress acute intestinal infections in infants and young children as it is doing in the case of the quintuplets, and should lower the average blood pressure in this country ten points as it does in China, and increase longevity.(Hunter)

613.2

Soup

and written

Much is said in these days about the value and economy of soups. The American housewife is contemporary criticised for her lack of thrift in not making use of her scraps ~~bones and meat~~ and preparing from them such appetizing soups as do her French sisters across the water, Every cookbook and teacher of cookery makes it a point to emphasize the value of soup as an article of diet and not desiring to be behind my contemporaries I too am going to try to ~~emphasize~~ show the importance ~~value~~

Leave four lines blank to be filled in afterwards

a rather thick gravy.
If the material is now
cold it must be reheated
salted and flavored.
If onion or celery is ~~to be~~ desired
used for flavor add a slice or
two of onion or a few stalks
of celery allowing them to
remain in the soup during
the reheating, then ~~removing~~
~~with a fork or strainer~~,
by the time the soup is well
heated it will be delicately fla-
vored and the pieces of onion
or celery may be removed
with a fork or skimmer. Add
now a quantity of cream as
seasoning in the proportion
of one cup of thin cream for every
2 quart of soup and for fear
of any lumps which may
still remain in the soup turn

again through a colander
or chinese soup strainer into
the soup tureen, and serve,
If the soup is desired especially
nice whip the cream before
adding or beat the hot soup
for a few moments after the
cream is added with an egg beater
The consistency of the soup
when complete should be about
that of thin cream. If
it is to thick when completed
it can be easily thinned. If
too thick it must needs be
thickened by the addition of more
material or by thickening with a
little flour rubbed smooth in milk
in the proportion of 1 table spoon to qt.

Since these soups are so largely composed of food material it is necessary that they be retained in the mouth long enough for proper insalivation and in order to insure this it is a most excellent plan to serve with the soups what the french call croutons prepared by cutting stale bread into small cubes and browning in a slow oven; This plan also serves another purpose of providing a means whereby all the left over bits of stale bread may be utilized to advantage

of soup but fearing that you are already satiated with knowledge concerning soups prepared from meat and bones I have chosen to speak of a class of soups not so generally well known namely soups made from legumes, grains and vegetables without the previous preparation of a stock.

The advantages of these soups are certainly equal and in many instances surpass the soups prepared with stock. In point of nutritive value soups prepared from some of the legumes or grains are superior to soups prepared from meat and bones. It is generally allowed that from one quart of meat soup 1/2 lb of

and one half pounds of meat will be required. In the bone there is little or no nourishment, simply flavoring substance and gelatine which gives to the soup a better consistency so that really there is only 1/2 lb of material containing ~~any~~ nutriment ~~at all~~ for the quart of soup and the proportion of this amount which would fall to each person served from the quart of soup thus prepared would be very ~~small~~ mere indeed. Suppose in contrast we have a pea soup. 1/2 lb of peas would be amply enough for a quart of soup and we may look upon the chart and compare the nutritive value of the two foods. — Peas contain 86.6

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$$\begin{array}{r} 8\,6\,4 \\ 2\,8\,\overline{)\,8} \end{array}$$

parts nutritive material while lean beef contains only 28 parts in 100. So that supposing we used the same quantity of material in making both kinds of soup the quart of soup made from the peas contains a little more than three times as much nourishment as does the beef soup, or in other words a cup and a half of pea soup is equal in nutritive ~~has as much nourishment~~ ~~is nutritive as~~ to a quart of the beef soup, made of meat and bones. In point of economy the cost of the pea soup would not rank higher ~~better~~ that made from meat while as regards the time and trouble of preparation ~~it~~ the pea soup is much easier to make and as to its palatableness I will leave you to judge for yourselves

when we come to test the samples.
A well prepared Soup is a most valuable food
well deserving of the
~~first~~ place on the bill of
fare & of very ~~[illegible]~~ in the land
Served hot at the be-
ginning of a meal it stimulates
the flow of the digestive juices
and in the process of its preparation the ma-
terial of which it is composed
is so broken up and divided
that it is more readily digested
than in any other form. Especially
is this true as regards soups
made of legumes and grains.
Aside from the mashed pea and
beans mentioned yesterday ~~soups~~
beans, peas and lentils are more
digestible in soups and a

a larger proportion of their nutritive material usable than in any other form. ~~another advantage which makes this form~~ ~~despite the~~ In the preparation of soups from meat and bones the base of the soups is water In fact the soups is water holding in solution the essence of meat water alone or in solution taken with a meal must be absorbed before the digestion of solid food in the stomach can begin for this reason it often happens that the use of meat soups in connection with other foods sometimes proves such a hindrance to digestion that persons with weak stomachs are unable to use this kind of food at all. The base of such vegetable soups as I ~~am~~ shall show you however is

milk instead of water and milk all thing of fluid in character is in itself a food and is readily digested in connection with other foods.

In preparing soups from grains, legumes and vegetables the material should be first cooked in the ordinary way, using as little water as possible and cooking as slowly as possible so as to more thoroughly break up the tissues. The purpose to be attained in the cooking of all foods is that partial digestion of the food elements and in general the more with such foods as grains & legumes slowly & if continuous the cooking is the the more completely this will brought about.

Julienne Soup.- Take an equal proportion of carrot, parsnip, turnip, celery and string beans, cut into thin pieces of inch lengths, sufficient to make one pint. Simmer the vegetables gently in a small quantity of water until tender, but not long enough to destroy their shape.

Heat a quart of clear stock to boiling , add the vegetables, salt to taste and serve.

Other vegetables as peas, asparagus, etc, may be used in their season. Sometimes the vegetables are cut into dice or fancy shapes with a vegetable cutter. It makes little difference about the shape so that the pieces are small and uniform in size. Vegetables which require a longer time for cooking should be cut into smaller pieces.

Tomato Soup.- Into two quarts of boiling beef stock stir a teaspoonful of cornstarch well braided with a little cold water, and a pint of strained, stewed tomatoes. Boil a few minutes and serve. A teaspoonful of sugar may also be added if desired.

White Soup.- White soups are made from veal or chicken stock, seasoned with cream, flavored with onion or celery, and thickened with cornstarch or flour.

Vermicelli or Macaroni Soups.- Drop into boiling water and cook macaroni about one hour or vermicelli ten minutes. Drain well, pour cold water through them to separate the pieces which are apt to stick together, and add to boiling stock(beef and veal are preferable) in the proportion of a pint of cooked macaroni or vermicelli to a quart of soup. Salt to taste and serve.

Potage a la Reine.- Take a quart of chicken stock from which the fat has been removed. Add a stalk or two of celery cut into finger lengths and a slice of onion, and put to boil. Beat together the mashed yolk of two hard boiled eggs, and a half cup of sweet cream. Chop the white meat of the chicken until fine as meal and beat with the egg mixture. Add slowly a cup and a half of hot milk. Remove the celery and onion from the hot stock and stir all together. Boil up, salt to taste and serve. If too thick a little more stock or milk can be added.

Tapioca Cream Soup.- Soak two tablespoonfuls of tapioca over night. Heat a quart of stock prepared from the white meat of chicken, to boiling in a sauce pan.

Then stir the tapioca in gradually. Move the saucepan to the side of the range where it will simmer.till the tapioca is transparent. Have ready in a large dish a mixture prepared by beating together very thoroughly the yolks of three eggs and four tablespoonfuls of sweet cream. When the tapioca is clear, remove the stock from the range and pour it very gradually on to the egg mixture, stirring briskly all the time so that the egg will not curdle. Season with salt if desired. The soup may be returned to the stove and warmed before serving if necessary, but it must not be boiled or allowed to stand a long time.

MEAT SOUP.

Soups made from meat require first the preparation of a special material called stock a liquid foundation upon which to begin the soup.

Beef, veal, mutton and poultry are all made into stock in the same manner, so that general rules for its preparation will be sufficient for all meat soups.

The stock which constitutes the bulk of the soup, should ~~be the fluid~~ contain as much nutriment as possible, indeed it should be the fluid extract of all the nutritive elements contained in the substances from which the stock is made. The principal constituents of meat and bones, the material from which stock is compounded are fibre, albuminous elements, ossein-like substances and osmazome. Of these the albuminous are the most nutritious and are found only in the flesh. Ossein is a gelatinous substance found in the bones, skin and tendons and is almost devoid of nutriment. Osmazome is the element which gives to the meat its distinctive flavor. In selecting material for stock, therefore, it is well to remember that the larger the proportion of lean meat used, the more nutritious will be the soup. But little else than gelatine is obtained from the bones, and although serviceable in giving consistency, a soup made principally from bones is not valuable as a food. The amount of bone used for soup should never exceed the flesh material in weight. The bones, trimmings and remnants of steaks, chops and roasts may be advantageously utilized for soups. Bits of roast meat and roast gravies are especially valuable material since they

are rich in osmazone , the flavoring element of meat.

In nearly every household where animal food is used there are w enough scraps of cooked and uncooked meat, if carefully saved, to supply the family board with fragrant soups at only a slight outlay for additional material. The greatest care, however, must be observed to preserve the scraps perfectly sweet and fresh until needed, as stale meat is exceedingly unwholesome.

If the scraps are mostly cooked meats and bones, a small portion of raw lean meat should be used with them; it need not be of the choicest quality, tough, course meat when fresh and good, can be advantageously used for soup stock.

If fresh material is to be procured, select for beef soup, a piece from the shin or lower round; the same choice of pieces may be made of veal; of mutton, pieces from the forequarter and neck are best.

In preparing meat for soup do not lay it in a pan of cold water to soak, because it will lose more or less of its nutriment; if it is soiled, scrub the outside thoroughly with a clean cloth wet in cold water, or cut away the soiled portion. Break the bones into as small pieces as convenient; cut the meat into inch dice and remove the marrow from the bones and put it aside. If added to the stock it will make it greasy.

Having selected proper material and prepared it for use, the next step is to extract the nutriment. To do this put it into cold water, bring very gradually to the boiling point and hour is not too long for this; then cook slowly but continuously. In the

observation of these simple measures lies the secret of success in stock-making.

The albuminous elements of the meat which are similar in character to the white of an egg, are readily dissolved in cold or tepid water, but boiling water coagulates them. If the meat is put into the stock pot with the water boiling, the albumen coagulates or hardens, forming a sort of crust on the outside of the meat which prevents the inner juices from escaping, while if the meat is put to cook in cold water, and is gradually raised to the boiling point, the soaking and simmering will easily extract and dissolve the juices.

Salt likewise hinders the extraction of the meat juices and should not be added to stock during its preparation.

The best utensil for use in the preparation of stock is a soup digester. This is a porcelain-lined kettle, resting on standards, with a cover fitting closely into a groove, so that no steam can escape except through a valve in the top of the cover. In this utensil the meat can be placed and allowed to cook for hours without burning. An ordinary granite-ware kettle with tightly fitting cover answers quite well. It should however, be kept entirely for this purpose.

The correct proportion of water to be used is about one quart to each pound of meat and bones, though this will vary somewhat with the material and the length of time required for cooking. The scum which is thrown to the surface of the water during the cooking process is composed of blood and other impurities and

should be removed as rapidly as it rises. If allowed to remain after the water reaches the boiling point it will become incorporated into the stock and injure it in flavor and wholesomeness.

If the meat and bones are well cut and broken, the valuable juices ought to be all extracted, with proper cooking in three or four hours. Longer cooking will render the stock thicker and more gelatinous but not more nutritious, and too long cooking will detract from its flavor. As the longest as soon as the meat will fall from the bones the stock should be removed from the pot and strained. Do not let it stand.

A good way to strain stock is to place a colander over an earthen crock or jar (the colander should fit inside the jar) with a strainer cloth within the colander. Then dip the contents of the stock pot into the colander, and leave it there to drain for fifteen or twenty minutes. Do not squeeze the cloth, and when well drained throw the scraps away. After having incorporated into the stock all the nutriment from the meat do not expect the worthless residue of muscular tissue to be of any value as food.

French cooks ~~ish~~ with their propensity for economy sometimes select a good quality of beef, cook it so as to retain a portion of the juices in the meat and make it serve both for preparing the soup and for boiled beef on the bill of fare. The meat is not cut up, but is heated quickly and removed as soon as tender so that only part of the juices are extracted, but we certainly do not see the economy of thus dividing the nourishment.

Set the stock where it will become c ld. The more rapidly

it cools the more delicate will be its flavor and the better it will keep. The fat will rise to the surface, and can be easily removed when desired. If the quantity of fat ~~and~~ the material used was considerable, a solid cake will cover the top. This fat, by excluding the air, helps keep the stock sweet and should not be removed until the stock is needed.

If only a portion is to be used at one time the remaining with the fat should be reheated and cooled that a new crust may be formed. In winter, stock may be kept several days, if care is thus taken to reheat it. In summer, unless kept in a very cold place, it will be likely to spoil in twenty-four hours.

Soup should never be greasy, and hence before using the stock every particle of fat should be removed. To accomplish this, loosen the cake of fat from the dish with a knife and if solid it will sometimes come off whole; if soft; remove all that is possible without cutting into the stock, and afterwards wipe the top of the jellied substance with a cloth wrung out of very hot water, which will readily absorb any lingering portion of fat. If the stock is not jellied, skim off all the fat possible and then turn the stock through a napkin wrung out of ice water. This will harden the grease which will adhere to the napkin. It is always better to prepare stock long enough before it is needed to allow it to become perfectly cold; ~~as~~ if, however, it is necessary to use the stock very soon after it is prepared, the fat may be quickly hardened by turning the stock into a dripping-pan or some other shallow dish and placing it on ice in a cool place; if

there is no time for this, strain several times through a napkin wrung out of ice-cold water. Removing the particles of fat each time and wringing the cloth anew, remove the cloth from the ice water before straining again. A little cold water poured into hot stock will also cause the grease to rise so that it can be easily skimmed off, but this method weakens the stock.

Stock may be prepared from one kind of meat only, or from two or more different kinds mixed together. Chicken stock is generally conceded to be better if a small portion of beef is combined with the fowl. Beef and veal are largely used together. But mutton on account of its strong flavor is better used alone.

Stock when prepared from a single kind of meat is termed simple stock or broth. When prepared from two or more kinds of flesh cooked together, or when stock prepared separately from different kinds of meat are mixed together, the result is termed compound stock or double broth. With either of these stocks as a foundation, an innumerable variety of soups may be prepared, either by serving them as plain broth or by the addition of some of the various grains and vegetables, each soup taking name from its principal solid ingredient.

Carmel for Coloring Soup Brown.- Melt half a pint of sugar and one tablespoonful of water in a saucepan over the fire; stir constantly until it is of a dark brown color; then add a half pint of boiling water, simmer ten minutes, strain and put into an air-tight can or bottle. When needed mix such a quantity

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S O U P S .

Soup is the most wholesome, palatable, economical, and in every way, desirable article of food we can serve. It might well form the first course upon every dinner table of the land. Its valuable points are that served hot at the beginning of a meal it acts as a stimulant to the flow of the digestive juices, while in a the process of preparation the material from which the soup is made is so broken up and divided as to be more easily acted upon in this form than any other. Especially is this true as regards such soups as are compounded with peas, beans and lentils, which are among the most nutritious foods, and are, when made into soups, very digestible. A much larger proportion of the nutritive ~~xx~~ element they contain is usable when prepared in soup than when eaten in any other form.

When soup is generally spoken of it is supposed that some preparation of meat and bones is meant, but such soups cannot be considered at all on a par with soups made from grains and legumes. In the first place, meats, the material from which soups is made, is not as nutritious, even when the best of it is used, as are peas, etc., as may be readily seen by the chart. It is generally allowed that for one quart of meat soup one half pound of meat will be required. In the bone there is little or no nourishment, simply flavoring substance and gelatine, which gives to the soup a better consistency, so that there is really only one half pound of material containing nutriment. Of this, the amount which would fall to each person served from the quart of soup thus prepared,

would be very meager indeed. Suppose in contrast we have pea soup One half pound of peas would be ample enough for a quart of soup, and we may look upon the chart and compare the nutritive vaule of the two foods. Peas contain 86.6 parts nutritive material while lean beef contains only 28 parts in 100. So that suppose we used the same quantity of material in making both kinds of soup, the quart of soup made from the peas contains a little more than three times as much nourishment as does the beef soup, or in other words, a cup and a half of pea soup is equal in nutritive value to a quart of the soup made of meat and bones. In point of economy the cost of the pea soup would not rank higher than that made from meat, while as regards the time and troubleof preparation, the pea soip is much easier to make, and as to its palatableness I will leave you to judge for yourself when we come to test the samples.

Besides such a small percent of nutritive material meat soups contain a good deal of unwholesome material in the form of excrementition, which was on its way out of the vital domain of the animal when slaughtered, and which is found in the blood of all living creatures. The Jews recognized this fact, for their rules for the use of meat were very strict indeed. Every animal had to be well bled, and its flesh, if eaten, had to be soaked and soaked in salted water to draw out all the juices before it was cooked at all. What they soaked out and threw away as unfit for food is what people endeavor by careful means to collect in water and serve as meat soups. Meat soups are simplythe extract of the blood and other juices of the meat, and while possessing but a minimum of

nutritive material, it does contain much effete material which cannot be regarded as at all wholesome.

Legumes and grains prepared in soups have all the advantages of any soup and none of the disadvantages of meat soups. The material to compose the soup should be first cooked in the ordinary way, as little water as possible being used so that there will be little or none to drain off. When well done the next step is to get it to a homeogenous mass, for which purpose we rub it through a colander. The next step is to add to the sifted material a certain amonnt of fluid, milk or water, to make it of the right consistency. It must now, if cold, be reheated, seasoned and flavored. If celery or onions are to be used as flavors add a few stalks or slices to the soup as it is placed upon the stove for reheating. By the time the stove is well heated it will be delicately flavored and the slice of onion or stalks of celery may be removed with a fork or skimmer. Soup in order to fulfill its true mission, should be pleasing in appearance, as well as appetizing to the taste. To secure that smoothness which characterizes a true soup, it may, if necessary, be put through a colander the second time.

The nutritive value of soup of course depends upon its ingredients, and these should always be chosen with reference to the maintaince of health. If the soup is made from a material lacking in nitrogenous elements, for example, one composed of tomato, or potato, some article especially rich in nitrogenous material should be served with it in orderto supply the proper proportion

of nutritive elements.

The consistency of soup when complete should be about that of thin cream. If it is too thin it must needs be thickened by the addition of more material, or by thickening with a little flour rubbed smooth in milk in the proportion of one table spoon to the quart. Since these soups are so largely composed of food material it is necessary that they be retained in the mouth long enough for proper insalivation, and in order to insure this it is a most excellent plan to serve with the soup what the French call croutons, prepared by cutting stale bread into small cubes and browning in a slow oven. This plan also serves another purpose, of providing a means wherebynall the left over bits of stale bread may be utilized to advantage.

Soups are economical because they afford a very excellent means for using up left over portions of grains, legumes, and vegetables. They can be used in this way better than anynother-that is, if they have been kept fresh. Left over foods should be kept in the most careful manner possible. No sour or mouldy food should be used under any circumstances. If left over foods are to be used for soups, use only such together as will harmonize--as will make a good combination--when we can make that selection. In making soups from left over foods always take some one kind as a sort of base and another as a sort of flavoring. For seasoning your soup if you have not cream in plenty, an egg or two may be used as a substitute in the proportion of one egg to about three

pints of soup. The egg should not be added to the entire mass but should be added to a small portion first, and then that added to the whole amount. If cream is used for seasoning, one cup of thin cream to a quart of soup is sufficient. By thin cream I mean what is sometimes called twelve hour cream or single cream. When kept for twenty four hours it is called double cream. The process of making soups is so very simple that no one can fail to understand it.

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Suggestions

~~General Rules~~ for the Preparation of Vegetable Soups.-

In making soups from grains vegetables and legumes the first step is to ~~in the~~ cook them in the usual manner using as small a quantity of water as possible. It is not always possible to determine the exact amount of water required but it is better to begin with a small quantity and if necessary add more, rather than put on too much at first. If water be added let it be of boiling temperature in order that the cooking may not cease.

Soups should be of an equal consistency throughout, and in the preparation of vegetable soups the ingredients should be rubbed through a wire sieve or colander when tender; otherwise the mixture will be a sort of mushy hodge-podge instead of soup. Good soups should be attractive in appearance, as well as agreeable to the taste. In making soups of dried beans, peas, etc., the sifting is absolutely essential, since the skins are not easily digested, and should be removed.

If grains and shredded vegetables are to be added they should be cooked only until tender, ~~not till they are dissolved.~~ It is best to cook them separately and afterwards add to the soup.

If soups are too thick, dilute with milk or water; if too thin, they may be thickened with a little flour or cornstarch braided with milk, used in the proportion of one tablespoonful for a quart of soup - heaping if flour, scant if cornstarch- and remembering always to boil the soup five or ten minutes after the thickening is added that there may be no raw taste.

When milk is added to soups just previous to serving use

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SOUPS.

Soup is an easily made, economical and, when properly prepared from healthful and nutritious material, wholesome article of diet, though the weak, sloppy, greasy compounds often served under that title, are hardly to be recommended.

To be of the most value as an article of diet soup should contain as small a proportion of water, and as large an amount of nutritive material, as possible. Soups containing a large amount of water are not so quickly digested as solid foods, since the fluid portion must be absorbed before the process of digestion can be carried on. Scientifically prepared, the solid matter which enters into the composition of most vegetable soups is so broken up in the process of preparation that it is readily dissolved by the digestive juices. Especially is this the case with soups made from dried peas and beans, both of which are very nutritious foods, and much more easily digested in a well-prepared soup than in any other form. Taken hot at the beginning of a meal, soup stimulates the flow of the digestive juices, and on account of its bulk brings a sense of satisfaction before an excessive quantity of food has been taken.

In general when soups are mentioned some preparation of meat and bones is supposed to be meant, but soups made from animal food are not more nutritious than those made from the grains, and legumes. Indeed, if we compare the relative value of the two classes of food, as given by various eminent authors on the subject, we shall find that the grains and legumes contain a larger prop-

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ortion of nutritious elements and fewer objectionable features than flesh foods, while they have the added advantage of being less expensive. In point of digestibility, too, soups prepared from grains and legumes must rank before meat soups, since, when properly made, they contain more solid material and less water

The nutritive value of soup depends of course upon its ingredients, and these should always be chosen with reference to the maintenance of health. If the soup is one lacking in nitrogenous elements, for example, if the soup selected be one composed of potato, tomato, or any like ingredients largely composed of starch and water, some article especially rich in nitrogenous elements, as whole-wheat bread, zwi back or whole wheat wafers should be served with the soup in order to supply the proper proportion of nutrition.

Milk is a factor of no small importance in the preparation of vegetable or grain soups, and should be used largely in the place of water when available. It is in itself a perfect food, consequently adds to the nutritive value, and serves the purpose of a fluid at the same time. With such vegetables as potatoes, parsnips, and others of the class composed largely of starch, and containing but a small proportion of nitrogenous food elements, milk should enter largely into their composition, as an addition to their food value, as well as to their palatable qualities.

hot milk rather than cold.

Whole-wheat bread, cut into dice and browned in the oven, makes excellent croutons to serve with soup. Put a spoonful or two of them into each plate, and dish the hot soup over them. Most soups are nicer and more sure to be free from lumps if turned through the colander a second time in pouring from the kettle into the tureen. If cream cannot be had, the well beaten yolk of one egg for every quart or three pints of soup will answer as a fair substitute. The egg should not be added to the body of the soup, but a cupful of hot soup may be turned slowly on to the egg, stirring vigorously all the time in order to mix it well without curdling, and then the cupful stirred into the whole.

Soups offer a most economical way of making use of the "left over" fragments which might otherwise be consigned to the refuse pail. A pint of cold mashed potatoes, a cupful of stewed beans, a spoonful or two of boiled rice, stewed tomatoes or other bits of vegetables and grains are quite as good for soup purposes as fresh material, provided they have been preserved fresh and sweet. To insure this it is always best to put them away in clean dishes; if retained in the dish from which were served, the thin smears and small crumbs on the sides will spoil much sooner than the larger portion, and will help to spoil the rest. One may find some difficulty in rubbing these through the colander unless they are first moistened. Measure the cold food, and then determine how much liquid will be needed and add a part of this before attempting to put through the colander.

No special recipes can be given for making soups of

Hence I always turn such soups as are liable to be at all lumpy a second time through the colander. This may be done if desired into the tureen in which the soup is to be served. It makes a nicer soup to use whipped cream, and to add it just before serving. If it be found a difficult thing to rub the soup material through a colander add a small quantity of the liquid that is to be used. Cold left over foods can if they are well preserved be advantageously used for soups, a spoonful of left over oatmeal or cracked wheat or rice, a few cold vegetables can be utilized in soups much easier than in almost any way. It must be perfectly fresh and good however, no stale foods should ever be used in this or any other way to make food. If left over foods are used for soups only such as harmonize well together should be combined in the same soup. Some one suitable kind should always be taken as the base of the soup and the others used as seasoning, for example, suppose I had left over from breakfast a half dozen potatoes, a saucer of rice, and from yesterdays dinner a bit of stewed tomato. I can combine them using the rice and potato as a base and the tomato as seasoning into a most excellent brown soup with the addition of a trifle of other material. For seasoning soup if cream is not plentiful eggs may be used ~~plentiful~~ as a substitute the well beaten yolk of one egg for every quart or 3 pints of soup. The egg should not be added to the body of the soup but a cupful of hot soup may be carefully turned over the egg beating it to an emulsion which can then be safely turned into the whole. Of cream one cup of

It is quite as easy to prepare soup for Sabbath as any other day by running the material through the colander the day before and putting it on ice, then adding the milk and cream and re-heating in a double boiler. It can be heated in five or ten minutes. Soups are an article of food that should be used much more than they are. Very many people make no use of soup. There is certainly no better form in which the vegetables and legumes can be served than in a hot appetizing soup at the beginning of a meal.

Recipe for pea and tomato soup.

Take one pint of peas which have been soaked over night and cook them in one quart of water; then rub them through a colander. Add to this one cup full of mashed potato (cold will do as well as fresh), one pint of boiling water, two cups full of stewed and strained tomatoes, salt if desired, and one cup of cream.

Rice soup.--Pick over and wash six tablespoonfuls of rice. Put this in an earthen dish with a quart of water and cook in a moderate oven until the rice has absorbed the water. This will happen before the rice is quite tender. Add to this one quart of rich milk, salt if desired, and any flavoring you may like. To flavor with celery, turn the soup into a kettle and add two stalks of celery cut up into pieces three or four inches long. Then boil for ten minutes, remove the stalks of celery and serve. Cold steamed rice can be used for this soup. Boiled rice will not do. Every grain must be perfect when the soup is completed.

possesses in the preparation of soups from meat and bones the base of the soup is water. In fact the soup is water holding in solution the essence of meat . Water alone or in solution taken with a meal must be absorbed before the digestion of solid food in the stomach can begin for this reason it often happens that the use of meat soups in connection with other foods sometimes proves such a hinderance to digestion that persons with weak stomachs are unable to use this kind of food at all. The base of such vegetable soups as I shall show you however is milk instead of water and milk although fluid in character is in itself a food and is readily digested in connection with other foods.

In preparing soups from grains, legumes and vegetable s the material should be first cooked in the ordinary way, using ~~in the~~ as little water as possible and cooking as slowly as possi ble so as to more thoroughly break up the tissues. The purpose to be attained in the cooking of all foods is that partial digestion of the food elements and in general with such foods as grains and legumes the more slow if continues the cooking is the more completely this will brought about.

a rather thick gravy.

ortion of nutritious elements and fewer objectionable features than flesh foods, while they have the added advantage of being less expensive. In point of digestibility, too, soups prepared from grains and legumes must rank before meat soups, since, when properly made, they contain more solid material and less water.

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Lecture No. 6.

Soups.

I consider soup one of the most wholesome, economical, and in every way desirable articles of food. Served hot at the beginning of the meal it stimulates the digestive juices, and in the process of preparation (when properly prepared) the material of which it is composed is so broken up that it is made into its most digestible form. Especially is this true of soups prepared from the grains and the legumes. In the form of soup we have more material that is useable than in almost any other form in which we may cook legumes. When soup is generally spoken of, we are supposed to mean some preparation of meat and bones, but soups prepared from meat and bones are by no means more nutritious than they are prepared from grains and legumes, and in other respects are decidedly less wholesome, even when we use meat in its very best condition. Of the difference in nutritive value you will need no proof, because you can look at the chart and see for yourselves. In the making of meat soups, we use only a small proportion of meat, and then we endeavor to extract the juices, so that only a small proportion of the nutriment is used after all. Beef soup is about the same thing as beef tea, which Dr. Austin Flint, one of the most eminent physicians of America, calls a starvation diet, and it has been proven that it will not sustain life. Besides the small percentage of nutritive material which a meat soup contains, it contains a good deal of unwholesome material in the form of excrementitious matter which was on its way out of the vital domain when the animal was killed. This same material is found in the blood of all living creatures. The Jews recognized this fact, and their rules for the use of meat were very strict indeed. Every animal had to be well bled, and the flesh before being cooked and eaten had to be soaked in salt

water to draw out all the juices before it was cooked at all. So they soaked out and threw away as unfit for food exactly what cooks now try to preserve and make into meat soup. Another reason why meat soups are not as wholesome as those prepared from grains and legumes is because the base of meat soups is water, and when taken into the stomach it must like water in any other form be absorbed before the digestion of solid food will begin. Consequently for people with weak stomachs meat soups are often very unhealthful and prove a hinderance to digestion when used in connection with solid food.

The legumes, grains, and vegetables prepared in wholesome soup make one which has every advantage that any soup has, and none of the disadvantages of the meat soups, because as far as practicable we use milk as the base of all vegetable, grain, and legume soups, and milk although fluid in character, is not composed of so much water that it all has to be absorbed before the digestion of solid food begins. By using milk as the base for these soups, the nutritive value is much higher than though only water were used. They are also much more quickly prepared than meat soups. To make meat soup requires a long and laborous process, whereas you can make vegetable soup in a short time.

In making soups from legumes, grains, and vegetables, they should first be cooked in the ordinary way, using only a small proportion of water so that little or none will be left to drain off after the material is done. Having cooked the food, the next step is to make it homogeneous. To do this we run it through a colander. The kind of colander depends very much upon the material. There are some coarse materials made into soups which are just as well run through a coarse colander, while others require a fine colander. The next step is to add to the material a certain proportion of liquid. This should be milk, or milk and cream. If it be cold, It must now be reheated ~~before~~ flavored and salted

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so that the draft will not strike it. I think the most convenient device is to wrap it in a blanket. Keep this mass of dough at about 75 degrees until it is well risen, which it will be in about three or four hours. It should then be kneaded into loaves and allowed to rise again before baking.

Strawberry Sherbet.

This is the most delicious of all the preparations of strawberries, and if a good ice-cream freezer is a part of the kitchen furnishings, as it should be, it is not difficult to make. Boil one quart of water and three cups of sugar together twenty minutes. When cold, add to this syrup one pint of strawberry juice and the juice of one small lemon. Freeze, and let it stand two or three h ours to harden. If the berries are very sweet, less sugar will be required, but at this season, and in city markets especially, they are very sour. This sherbet, if properly frozen, should turn out of the can in a solid crimson shape, and will be found delicious. In the absence of a patent freezer, the mixture may be put in a tin pail with a perfectly fitting cover, and this set in a large wooden one and packed in ice and rock salt for several hours. Many people prefer it frozen in this way, but it is much coarser grained.

To Can Corn.- "Split the kernels lengthwise with a knife, then scrape with the back of the knife, thus leaving the hulls upon the cob. Fill cans full of cut corn, pressing it in very hard. To press the corn in the can, use the small end of the potato masher, as this will enter the can easily. It will take from ten to a dozen large ears of corn to fill a one-quart can. When the can is full, screw the cover on with the thumb and first finger, which wil make it tight enough; then place a cloth in the bottom of a wash boiler to prevent breakage. On this put a layer of cans in any position you prefer, and over the cans put a layer of cloth, then another layer of cans. Fill the boiler in this manner, then cover the cans well with cold water, place the boiler on the fire, and boil three hours without ceasing. On steady boiling depends much of your success. After boiling three hours, lift the boiler from the fire, let the water cool, then take the cans from the boiler and tighten; let them remain until cold, then tighten again. Wrap each can in brown paper to exclude the light, and keep in a cool dry cellar, and be very sure the rubber rings are not hardened by use. The rings should be renewed every two years. I would advise the beginner to use new rings entirely; for poor rings cause the loss of canned fruit and vegetables in many cases. You will observe that in canning corn the cans are not wrapped in cloth nor heated merely filled with the cut corn. The corn in the cans will shrink considerably in boiling, but on no account open them after canning."

Rules for Selecting Canned Fruit.- Reject every can that does not have the name of the manufacturer or firm upon it, as well as the name of the company and the town where manufactured. "Standards", have all this. When the wholesale dealer is ashamed to have his name on the goods, fight shy of him.

Reject every article of canned food that does not show the line of resin around the edge of the solder of the cap, the same as is seen on the seam at the side of the can.

Every cap should be examined, and if two holes are filled in it, send the can at once to the Board of Health, with its contents, and the name of the grocer who sold it.

Press up the bottom of the can; if decomposition is commencing, the tin will rattle the same as the bottom of your sewing-machine oil-can does. If the goods are sound, it will be solid, and there will be no rattle to the tin.

Reject every can that shows any rust around the cap on the inside of the head of the can. If housewives are educated to these points, then muriate of zinc amalgam will become a thing of the past, and dealers in "swells" will have to seek some other occupation.

How to Grate a Lemon.

The grating of a lemon is a most simple operation, and it may seem that every one must know how to do it, but this is far from being the case. As many cases of curdled custards and sauces are caused by this fact, the right way in this case is very important. The object in using grated rind of lemon is to obtain the fragrance and flavor, which differ very greatly from any extracts, however good. Now, the whole of the oil which contains this fragment is at the surface -is, in fact, the yellow portion of the rind; therefore this, and only this, must be removed with the grater. The white part underneath is bitter, and will cause milk or cream to curdle, but it contains no part of lemon flavor. Yet when lemon flavor is called for, the lemon is often grated right down to the pulp in parts, while the yellow rind is left on in patches. A lemon should be grated evenly, beginning at the end and working around it, using as small a surface of the grater as possible to prevent waste. The habit of turning the lemon as you grate, comes as easily as to turn the apple under the knife when peeling. Generally twice across the grater and back between each turn will remove all the essential oil, but while guarding against ~~too deeply~~ grating too deeply, care must be taken to remove the whole of the yellow surface. A well grated lemon should be exactly of the same shape as before, have ne s deep scores into the pith, and have an oily-looking surface.

To Grate Lemons:- A sharp coarse grater which can be easily held steady in the left hand is important for this purpose. Begin at one end of the lemon, rub it up and down the grater two or three times just enough to remove the yellowmsurface then turn the least bit and with out stopping rub another small portion of the surface over the grater and thus continue until all the yellow portion has been removed. There should be none of the yellow skin remaining. The whole having been grated off evenly with no white spots to indicate that any portion had been to deeply grated.

The essential oil of the lemon is contained in the yellow part, the white portion is bitter and should not be grated.

When lemon peel is desired for flavoring remove all the yellow pulp from the grater with a fork, running the tines up and down in the direction of the holes and afterwards across them.

The paring should be so thin as not to remove any of the white portion of the skin.

Strawberry Apple Butter.- To three gallons strawberry juice add one and a half gallons grated apples, add sugar to taste. First boil and skim juice, add sugar, ~~three~~ then apples. Boil as other butters. Other fruits can be used in the same way.

This must be read under condition

Pound one-half a cup of coarse oatmeal until it is mealy; the best way to do this is to tie it in a coarse cloth and pound it with a wooden mallet; it is thus bruised without waste. Put it into a tumbler with cold water; stir it well, and when the sediment has settled pour off the mealy water into a saucepan. Fill it again with water, stirring it, letting it settle, and pouring off as before. Do this a third time, being very careful each time not to disturb the sediment in pouring. Boil this water which you turned off, for twenty minutes, stirring it often. Add one saltspoonful of salt, and if it is to thick add a little cream or all milk. In making the gruel this way you get all the nourishing quality of the meal, as that mixes with the water, and only the hulls, or coarse indigestible portion is left. It is not a difficult piece of work, and I think you will find it very satisfactory.

613.21

Vegetables as Food for Young Children.

Will you kindly publish a list of summer and winter vegetables that may be eaten by children from eighteen months to four years of age, providing that they have double teeth? At what age may they eat green peas, French beans, string beans, baked beans, onions, Brussels sprouts, cauliflower, delicate southern cabbage, lettuce, spinach, beet greens, beets, strained carrot, strained squash (winter and summer), parsnips, turnips, boiled celery, scraped green-corn, boiled rice, egg plant, asparagus, tomatoes, salsify, gumbo, sweet potatoes, white baked potatoes, Jerusalem artichokes.

Now to begin with, there are at least two ways in which food may be considered: first, is it good, i.e., distinctly nutritious and digestible; or secondly, can it be eaten without harm, or at least immediate harm? or, in other words, may one indulge the palate so much as to take it?

The average healthy adult digestion has the power of extracting nutriment from many articles of food which would not stand very high with the physiological chemist, and many delicacies of the table must be judged by their palatableness and not by their nutritive value. And it is entirely proper, and from some points of view desirable, that within reasonable limits the palate should be in such ways gratified.

Now, the question comes, why not let children have such varied diet? The natural inclination of the fond mother is to let the child have what she herself enjoys; and from this desire and from

the clamorous demands of the child whose curiosity is excited at the sight of, or perhaps by surreptitious tastes of articles which it would better not have, arise many of the questions put to the family physician - questions often put only when the latter has been called in to repair damages.

Now, the essential reason why children cannot have the variety of food accorded to adults is that their power of digestion is slowly acquired and (in our judgment at least) is most thoroughly developed when a great deal of time is devoted to the acquirement. The order of development of the various organs of digestion gives reasons why a certain order of feeding must be followed. And after the organs are developed, practical experience of the various forms of indigestion shows that the functional power of these organs is gained only by degrees.

Next comes the question of when to enlarge this dietary; and in our judgment the time is more often injudiciously hurried than delayed. As we have already hinted, the child's demands, which are only evidences of the same interest or curiosity which it displays toward a new toy or other object, are interpreted as "nature 's calls for more nutritious food," or some such convenient shibboleth. It would be well if the child were not brought to table, and so not exposed to tantalizing; and it should be a fixed rule never to gratify these demands on impulse, nor until the mother, or whoever is responsible for the child's care, has become fully convinced that it is time to make a change in diet . When made the change must be a part of a system and not a caprice. Nothing can well be worse than the habit of giving "tastes" of things.

In answering the inquiry as to specific vegetables, we follow what is the average result of observations on many children of different digestive power and under varying circumstances. We know that some children have a much greater digestive power than others, and we are prepared to admit that there may be breeds, so to speak, the descendants of families who have over-taxed their digestive organs until those only who are equal to such feats have survived. We know too that skill in cookery has much to do with making food digestible, and we sorrowingly acknowledge that English-speaking people, whatever else they have done for the world, have done little for the culinary art. Further, we know that the power of digestion may vary in the same individual. For instance, the city child, under the stimulating and invigorating surroundings of active life in the summer in the country, can eat freshly gathered vegetables with impunity of benefit, while he cannot eat vegetables of the same kind (or same name, perhaps, we should say) at his home in the winter. Our answers are for the average child under average circumstances.

At the age of eighteen months, or until the end of the second year, there are in the long list offered by our correspondent no vegetables which we could admit except white baked potatoes and perhaps boiled rice. At the earlier age mentioned, if they are used at all, it should be with watchfulness to see if the additional amount of starchy food is well borne. Cereals of various kinds (including bread) are assumed to be already included in the dietary. At the expiration of the second year, or in the summer following that time, some further experiments may be tried.

In the list are a number of vegetables which we should not give to a child at all under the age of four, nor indeed for some years later, such as cabbage, cauliflower and Brussels sprouts. The nutritive value of this group, especially by their salts, is well recognized, but they are, even if digested in the ordinary sense, liable to disturb digestion by their strong oils. The same may be said of the onion, although the onion of Spain and Bermuda, and probably of other warm countries, is far milder in this respect than that of the northern regions. The ordinary turnip and parsnip may be placed in this group because, while possibly less hard to digest than the preceding vegetables, their nutritive value is not sufficiently high to offset their disadvantages. All of the foregoing strong-flavored vegetables are considered as favoring flatulence. The carrot, also, while a wholesome food for adults, disagree easily with a delicate stomach, and we think that a young child is better without it. Into the adult dietary all of these vegetables properly enter , but children are to be fed not in accordance with the caprices of palate, but with reference to their best nutrition. To the unpampered child, well prepared and wholesome food is acceptable and adequate.

In the list is another group less objectionable but not very valuable as nutrients, such as boiled celery, asparagus, salsify, gumbo. The latter generally involves so much condiment or so many intricacies of cooking that we speak doubtingly of its admissibility; but by itself it seems harmless. The salsify is to be boiled, not fried, and asparagus plainly dressed. With these restrictions they may be sparingly admitted, but not recommended, after the third

or fourth year at the mid-day meal. The egg-plant owes so much of its palatableness to methods of cooking not suitable for children that it also should go in the postponed list. And in making this posponement we purpose to carry it on until after the second dentition has begun. Lettuce may be placed in the same category, or eaten with salt only. If dressed it is not admissible in childhood.

The raw tomato requires condiments inadmissible for children; stewed it may be given after four years and possibly earlier, but not at meal when milk is used. But here the point may as well be made that a child who has not yet begun its second dentition should be given but a sparing variety of food at one meal. In addition to the potato, which in this country so usually forms a part of the heavier meal, but one other vegetable should be allowed at a time. We take the period of dentition as a guide, not as absolute, but as indicating a certain degree of development.

Sweet potatoes and Jerusalem artichokes are less easily digested than potatoes, and we think they should not be used until after the third year is completed, and then their effects watched.

Green peas, if fresh, tender and well cooked, are generally admissible at three years of age. Sometimes, however, they cannot be borne, and must be stopped. French beans, shelled, belong nearly in the same place; while string beans usually would better be postponed till a year later. Baked beans with pork are a most valuable nutritive combination, but they are not the most digestible mixture possible. Beans stewed may be rather better. Their tendency to cause flatulence is proverbial. For these reasons we

prefer not to give the dish to young children, and when permittin it to allow it only early in the day. Scraped green-corn, if from selected ears, we have regarded as about on the same footing as string beans.

The summer squashes, meaning the watery varieties, have little nutritive value; but the pulp, carefully freed from seeds, may be placed beside the last-mentioned vegetable. The winter squashes, that is to say those with firm flesh, such as are used for pies, are of about the same digestibility and nutritive value as sweet potatoes, and if stewed or roasted may be sparingly used under the same circumstances. But the delicious pie is not "meat for babies."

Spinach, well boiled and finely minced, we have considered as generally easily digested, and permit it, unless there are indications to the contrary, at three years of age. The beet tops are somewhat less desirable, because not so tender.

This, we believe, covers the list of vegetables, presented in the question, and we hope that the reasons given for our choice of them for different ages may be helpful as regards other similar vegetables. In giving vegetables to children it hardly need be said that they are not to be given after the midday meal, nor also that it is assumed that all of these vegetables are obtainable in their best condition.

Babyhood.

613.2

HERE IT IS

THE THING YOU ARE LOOKING AFTER

An Honest Gluten Flour that will Make Good Bread

Our Wheat Gluten Flour is guaranteed to contain 40% of pure wheat gluten. We know it is there because we prepare the Gluten in our own factory and know it is pure, and add it to the best flour in sufficient quantity to produce the percentage required, and so we know it is there and don't depend upon any honest miller's word about it.

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THE CURATIVE PROPERTIES OF WATER

The Effects of Water upon a Person in Health.--

The effects of water upon a healthy person, the so-called physiological effects, depend upon its temperature, the mode of application, the duration of the application, the part to which it is applied, and whether the application is made to the entire surface of the body or to a part only. We will first consider the effects of general application.

General Cold Application.--

When cold water (70 to 50 degrees F.) is applied to the general surface of the body, the action of the perspiratory glands is instantly checked. The blood-vessels are contracted, the skin becomes pale and the blood is diverted to the internal portions of the body. The natural result is a cooling of the surface and a slight elevation of the temperature of the internal parts. Such a general application would be exceedingly dangerous were it not for the fact that the portal veins are capable of holding all the blood in the body; so that when the blood is prevented from entering the surface vessels an outlet is found in the large veins of the abdomen. Were it not for this provision, cold applications would be likely to produce rupture of the delicate vessels of the brain, lungs, and other internal parts. Such accidents rarely happen but there is a possibility that it may happen in certain disease conditions, as in apoplexy, a state of the body in which the blood-vessels has been narrowed and weakened. In such cases the inrush of blood following the application of cold water may be so rapid that a rupture of the blood-vessels of the brain may occur before there has been time for compensation through the accumulation of blood in the abdominal veins.

If the cold application is relatively short, that is, if the application is interrupted before the subject has become thoroughly chilled and exhausted, the blood-vessels of the skin soon become freely dilated, as shown be reddening of the surface. The skin is filled with blood which as it flows into the surface vessels, gives rise to a very agreeable sensation of warmth. If the surface is quickly dried, rubbed, and covered, the reddening of the skin continues for a long time. This great movement of blood toward the skin is, of course, accompanied by a great diminution in the amount of blood in the brain, lungs, stomach, kidneys, and other deeplying portions of the body.

There are other important effects which follow a general application of cold water to the surface which should be noted. The most important of these are fuller and deeper breathing, slower but stronger pulse, greater activity of the brain and nerves, increased strength and activity of the muscles, increased clearness of thought and ability for mental application. In fact, the activity of every bodily function is increased. Every organ, every cell of the body works more vigorously and efficiently. The stomach is prepared to make more and better gastric juice, the liver does its work more readily and efficiently, the kidneys secrete more freely, the skin is more active, sensible perspiration sometimes occurring; all the vital machinery runs at a more active and energetic rate.

The natural consequences of this are a feeling of buoyancy, exhilaration, energy and strength, increased appetite, increased power to digest, increased intestinal activity. These effects are truly wonderful and cannot be so fully produced by any drug known to man nor by any other application than the general cold bath. These effects result, not from harmful stimulation, but through quickened activity of the forces by which the tide of life rises higher, the wheels of life run more smoothly, and all the life processes are facilitated.

The effects of the cold bath are well recognized in everyday experience. When one is exhausted with labor and heat, simple bathing of the face and hands

brings great refreshment. An application made to the whole surface of the body operates in precisely the same way only on a larger scale, since the surface to which application is made is so much greater. The exciting effect of the cold bath is instantaneous. As soon as the cold water comes in contact with the millions of nerves distributed in the skin, invigorating impulses are sent inward to the nerve centers from which these nerves arise, quickening their activity and setting into more active motion all the machinery of the body.

A cold bath influences to a remarkable degree the process of heat production in the body, increasing the amount of heat produced and hence the rate at which the tissues are consumed to two or three times the normal amount during the application. When, however, a cold bath is continued for so long a time that the temperature of the blood is lowered, the production of heat is diminished through the cooling of the muscular tissues and of the parts which are active in heat production.

We may briefly summarize the effects of a general cold bath as follows:

1. The brain and nerves are excited, and the mind rendered clear and buoyant.

2. The muscular system is energized, the power of the muscles being increased and movement easier.

3. The heart's action is slowed and strengthened.

4. The breath is deeper and fuller.

5. The circulation in the skin is first lessened, then greatly increased by the return of blood to the surface on reaction. There is also a very considerable increase in the number of blood-cells. The composition of the blood is also changed in other important respects, increasing its power to heal diseased parts and to resist the encroachments of disease.

6. Heat production is increased, and after reaction occurs heat elimination is also increased; so that the normal balance is quickly regained.

7. A prolonged cold bath (5 to 15 minutes) lowers the temperature of the body by cooling the blood.

8. The general effect of a short cold bath (5 seconds to 2 or 3 minutes) is tonic and invigorating.

9. The general effect of a very prolonged cool or cold bath (5 to 30 minutes) is depressing.

10. The tonic effects of a short cold bath depend upon the reaction of the body, while the depressing effects of a prolonged cold bath depend upon the abstraction of heat, the lowering of the temperature of the blood, and the exhaustion of the nerve centers upon which reaction depends.

The General Hot Bath.

The effects of a general very hot bath (106 to 112 degrees) are somewhat similar to those of a short cold bath. At the first contact of the hot water with the skin, the vessels contract as when cold water is applied. but the next instant the vessels dilate, filling the skin with blood. The patient thus experiences in the very hot bath some of the same effects as those that follow after the conclusion of a cold bath. The vessels of the skin are, however, more fully distended and a larger amount of blood is drawn away from the interior.

The hot bath diminishes the activity of the peptic glands and other internal secreting organs, hence diminishes digestive activity and lessens the appetite. This effect is especially produced when the bath is prolonged to the extent of producing vigorous perspiration, provided, however, the hot bath is not followed by a cold bath, since the latter serves as an antidote for the depressing effects of the hot bath.

The effects of a ordinary hot bath (98 to 104 degrees) are, however, very different from those of the cold bath. There is immediate dilatation of the surface vessels and hence, diversion of blood from the internal parts to the skin. The effect upon the nervous system is relaxing and depressant. Although the movements of the heart are quickened, the force of the heart beat is weakened so that the general movement of blood throughout the body is not

increased. The general effect of the hot bath, then is depressing and relaxing. The direct contact of the warm water with the skin excites the sweat and fat glands to increased activity. There is thus a movement of fluids from the center of the body toward the surfact and through the skin outward, so that the body rapidly diminishes in weight in a hot bath through this loss of water.

There are five things to be especially noted as the result of the hot bath:

1. The depressing effect, the opposite of the effect produced by the cold bath.

2. The filling of the skin with blood to the fullest extent, thus draining the internal parts.

3. Loss of weight. This is due, not only to the escape of water through the sweat glands, but to the great increase of the combustion, or breaking down processes in the body, by which the tissues are consumed, which during a hot bath may rise to two or three times the normal rate.

4. The great lessening of muscular strength.

5. The sensation of weakness which, if the bath is greatly prolonged, may amount to great exhaustion and even fainting.

The Neutral Bath.

A bath administered at a temperature near that of the body (92 to 96 degrees F) is said to be a neutral bath, for the reason that it has no effect upon heat production, does not lower the temperature, does not interfere with the normal escape of heat, and produces no exciting effect upon any of the bodily functions. The rate of the action of the heart and lungs remains the same.

The chief effects of the neutral bath are increased activity of the kidneys and skin and a remarkable quieting of the nervous system. This is supposed to be due in part to the absorption of water by the skin whereby the nerves are rendered less sensitive. Water at the temperature of the

body is the most soothing of all applications, and when a person is immersed in the bath his skin is protected from contact with the air, clothing, and all other irritants.

Summarizing briefly, we may say that the effect of the cold bath is exciting and stimulating, that of the hot bath is depressing, while the neutral bath is soothing.

Reaction.

The first effect of a short application of cold is to check all the activities of the skin, and produce contraction of the blood-vessels, causing the skin to become pale. If the cold application is long continued, gooseflesh appears with chilliness, and shivering if the application is made to a large area of the skin. If the application is very short, these symptoms very quickly disappear; the blood returns to the skin, the palor gives place to a pink or even bright scarlet hue, the skin glows and tingles with returning heat. If the parts are covered, there may even be perspiration. This interesting series of activities which follow an application of cold is known as reaction. Many of the most important effects of water depend upon reaction. Sometimes, however, reaction is undesirable, as, when diminished rather than increased activity is the object sought.

Reaction is due to the activity of the nerve centers. When the cold water is brought in contact with the skin, the temperature nerves carry to the centers of the brain and spinal cord the impression of cold. Instantly the blood-vessels are made to contract so as to prevent the too great loss of heat. As soon as the cold is removed, sometimes even while the application is being made, the blood-vessels of the skin dilate, and the blood is sent through the skin with great vigor so that excessive cooling does not occur. This is accomplished through the increased action of the heart and of the surface vessels which also have a pumping action. These changes take place under the influence of the nerve centers of the brain and spinal cord. When these centers are very weak, reaction may fail, and if the cold application is continued

for a long time, the nerve centers may become exhausted so that reaction does not occur or may be very long delayed.

Reaction is quickest and most complete after a very short very cold bath. After a prolonged cold bath, reaction comes more slowly. If a person takes a short cold bath, a reaction follows at once. If a second cold application is then made, a second reaction will occur. If the application is thus repeated for a number of times, however, reaction will after a time fail to take place. The skin will remain cold and pale. In such a case the internal parts of the body are left in a highly congested state and very great harm may be done. General cold baths should always be so managed that complete and perfect reaction will occur as quickly as possible after the bath is terminated.

How Reaction May Be Encouraged.

Reaction may be encouraged in various ways:

1. By heating the body before the bath by means of exercise, or by a hot bath of some sort, hot air, vapor, hot water, or a dry pack. Vigorous rubbing of the surface is also an excellent preparation for a cold bath. The best of the several means mentioned are exercise and rubbing, provided that the exercise is not continued so long as to produce exhaustion. When the body is in a state of exhaustion, the power to react is lost and the cold bath may be very dangerous. This is the cause of the fatal results which sometimes follow bathing in cold water when exhausted by running or other violent exercise. Sweating is not a contraindication to a cold application unless it is accompanied by exhaustion or by fever, in both of which conditions cold applications must be avoided when the surface is moist with perspiration.

2. Reaction may be promoted by rubbing in the bath. By this means reaction is made to occur during the application and may be maintained. This method must always be applied in connection with a prolonged cold bath.

By the rubbing the blood circulation in the skin is maintained, and thus prolonged congestion of the internal parts is avoided. In fevers rubbing of the skin keeps the blood to the surface where it is brought under the influence of the cold water and is thus rapidly cooled. Rubbing the surface during the cold bath adds greatly to the comfort of the patient, preventing chilling and shivering.

3. Warming the body after the bath promotes reaction by encouraging the return of blood to the surface. This may be accomplished by exercise, by vigorous rubbing of the surface with the hand or with a towel, or by exposure of the body to heat by means of warm coverings and other warm applications. Reaction takes place more quickly in a warm room than in a cold room. Care should be taken to cover the body as quickly as possible after the bath as the evaporation of moisture from the surface rapidly cools the body and thus prevents reaction.

In general the best method of promoting reaction after a cold bath is to quickly wrap the body in a linen or Turkish sheet, rub the whole surface rapidly until it is dry, then dress quickly and exercise for 10 to 15 minutes, or until the whole surface feels warm and comfortable.

Headache, cold hands or feet, depression, languor, increase of a previously existing pain or other persistent uncomfortable sensations following the cold bath, are indications of imperfect reactions. If too intense reaction has been produced, the result may be undue excitation of the brain and nerves followed by depression. The indication, then, is that greater care should be taken to promote reaction, or lessen the intensity of the application by raising the temperature a little, or making the application of briefer duration.

Feeble patients may be prepared for the cold application by a very short hot bath. For the best effect, the hot application should be only of sufficient duration to excite perspiration. As soon as perspiration begins, the patient is ready for the cold bath. If the patient takes a cold bath in the morning immediately on rising, the hot bath is not required, as the body is already sufficiently warm.

Shivering, sweating and great exhaustion after a very general application of cold water, indicate that such an application should not be made for the reason that reaction will probably not occur, or the application if made at all must only be made after proper preparation of the patient. If the patient is excited, he must have opportunity for rest. If he is cold, or if any part of the body is cold, even the hands or the feet, every part must be thoroughly warmed before the cold application is made.

Internal Reaction.

The remarkable effects which follow a cold application to the surface are accompanied by equally remarkable changes within the body. The inrush of blood from the surface when an external application is made, agitates every internal part, while every cell is stimulated through the impression made upon the nerves. With the return movement of blood to the skin, another change occurs in which every cell in the body participates. A general cold application to the surface is one of the most powerful means of producing an alterative effect, or an agitation throughout the body. Not a single cell escapes the influence of such an application.

The most interesting effects of external applications of cold are seen when the cold is applied to a small surface. The same changes in the skin occur as when the application is made to a large surface, but the reddening, or reaction, occurs somewhat more quickly as the whole body assists in the effort.

A fact which it is of the highest importance to know is that while these changes are taking place in the skin, exactly the same sort of changes are taking place in the internal parts connected with the skin. A good illustration of this may be found in the means taken to resuscitate a fainting person. The application of cold water to the face is quickly followed by a return of blood to the cheeks and at the same moment return of consciousness.

Attention has already been called to the fact that each area of the skin is connected through the nerves with some particular internal part. The skin of the face and scalp is thus reflexly connected with the brain. When

the cold water is applied to the skin of the face, there is a very brief contraction of the blood-vessels of the skin and at the same time a contraction of the blood-vessels of the brain. The reaction which follows this contraction, shown by the reddening of the skin, takes place in the brain as well as in the skin. With the inflow of blood to the brain consciousness returns and the fainting person revives.

By a continuous application of cold the contraction of the vessels of the skin may be maintained, and such a continuous application likewise maintains the contraction of the blood-vessels of the associated parts. It is in this way that internal congestions may be relieved. Every one is familiar with the great relief obtained from simple bathing of the face and eyes with cold water when the head is congested, as shown by the flushed face, red eyes, and throbbing temples, a condition which naturally results from vigorous exercise on a hot day. If the whole scalp and neck are also bathed with cold water, the relief is still greater, for these parts are likewise reflexly connected with the brain. It must be remembered, however, that to produce the desired effect the cold application must be continued for some time; for the cooling effect is not produced by the direct removal of heat from the brain, but by maintaining the contraction of the blood-vessels of the skin and the simultaneous contraction of the blood-vessels of the brain, which we are able to accomplish through the wonderful relation through the nerves of the external skin with the innermost parts of the body.

The longer the cold application to a small surface, the more intense the contraction of the associated internal parts, provided, however, that the application shall not be continued so long as to benumb the skin. The reason for this will be readily seen. The effect desired is induced wholly through the action of the nerves. If the nerves are benumbed or paralyzed, no effect whatever is produced. Indeed, the opposite effect may result, for as soon as the stimulating effect of the cold application ceases through benumbing of the nerves, reaction with dilation of the vessels will take place in the internal

parts concerned, and thus the condition which it is sought to relieve will be agitated.

Every internal part of the body may be reflexly influenced by an application made to some portion of the surface. The most important facts bearing upon this point have already been stated. (See). If, for example, it is desired to lessen the amount of blood in the lungs, this may be accomplished by an application of cold to the skin of the chest, especially the front part of the chest, as the skin of this portion is more sensitive than the skin of the back. A cold application over the stomach likewise causes contraction of the vessels of the stomach. A cold application made to the skin, covering the lower part of the right side of the chest will influence the liver in the same way. The application of an ice bag to the lower third of the sternum relieves congestion of the kidneys, for the reason that this portion of the skin surface is reflexly connected with the kidneys.

By means suggested the amount of blood in any internal part may be lessened through contraction of the blood-vessels of the part by a continuous cold application. It must be remembered, however, that the cold application must be removed before the parts become benumbed, and reaction in the skin promoted by rubbing the parts or by a short application, or if more convenient the cold application may be left off until reaction occurs in the skin as shown by reddening. By this means the activity of the nerves may be maintained. Uninterrupted cold applications are never employed for the treatment of internal parts, but only in cases in which it is desired to maintain continuous contraction of the surface vessels, as in certain superficial congestions or inflammations.

While it is most frequently the case that cold applications are made for the purpose of lessening the amount of blood in an internal part, this is not always true. It is sometimes desirable that the blood-vessels of internal parts should be dilated so that a larger amount of blood may be made to pass through it. When this is the case, the cold application must be made of short

duration so that reaction with dilatation of the vessels and an increased movement of blood will take place in the internal part. As before remarked, this is what occurs when cold water is dashed into the face of a fainting person. In the same way the drowsy student rouses his brain to mental activity by a brief application of cold water to the face and eyes. A continuous application might produce an effect opposite to that desired. Short applications made over liver, stomach, or other internal parts, increase the activity of these organs, first by stimulating the gland cells and other tissues of the parts, and second by supplying an increased amount of blood through the reaction which immediately follows the application.

Internal reaction may be encouraged by the same means which promote external reaction, especially by rubbing and the application of heat. Simple covering of the part so as to retain heat and thus encourage heat accumulation, is an excellent and very common method of promoting the desired reaction. If, for example, it is desired to increase the movement of blood through the liver, a cold douche or other cold application over the liver immediately followed by vigorous rubbing and percussion of the parts would produce the result desired.

We might accomplish the same by an alternation of hot and cold applications. A cold application will cause contraction of the vessels of the liver; a hot application will produce instant dilatation of these vessels. A renewed cold application will cause a new contraction of the vessels, while a renewed application of heat will again dilate them. With each contraction the blood is forced onward through the organ, which is thus emptied of its blood, as one might empty a sponge bath by compressing it. With each hot application the vessels are opened and a new supply of blood enters. This amounts to a regular pumping process by which blood may be forced through the liver. It is evident that this operation may be continued for any length of time desired, or renewed as often as may be required; for so long as the blood-vessels of the skin contract and dilate under the influence of the applications made, the same

changes must occur in the liver as well. This principle may be employed in reference to any internal part whatever by making the application to the proper skin surface.

A more convenient method of promoting internal reaction and one which is generally sufficient is the following: An intense cold application is first made to the proper skin surface, as over the stomach if this is the part which it is desired to influence. Immediately after the application, a cloth wrung very dry out of cold water is applied over the parts, and this is covered with several thicknesses of flannel so as to retain the heat. By this means reaction is promoted and maintained. Under the influence of moist heat, the skin vessels become well dilated, and through the influence of the nerves upon the internal parts these are likewise dilated and the movement of blood through the parts is promoted.

A thorough understanding of these principles will enable one to control the activity of any organ of the body, no matter how far removed from the surface. By thermic applications properly managed, every bodily function may be influenced and the circulation of blood through every organ may be controlled. There is no other means known to man by which this can be accomplished, and in these facts we have the evidence that water as a means of communicating heat and cold to the body is the most valuable and the most potent of all curative agents.

Fluxion.

When two water faucets are supplied by the same pipe, the force of the stream from one may be increased by closing the other. When the garden spray is being used to water the lawn, the shower bath in the house will have less force than when the spray is not in use, and vice versa. By suitable applications of water this principle may be brought into useful operation in the treatment of various disease conditions. The skin covering the surface of the body is connected through the blood-vessels, in most cases very directly, with every important internal organ. The muscles, for example,

are supplied with blood by the same arteries which bring blood to the skin overlying them. It is also known that the blood-vessels of the liver, the stomach, and other abdominal organs, as well as of the lungs, the brain, and the spinal cord, are connected with those of the overlying skin.

If now, we make a hot application to some port of the surface, as, for example, the thigh, the blood-vessels of the skin being close to the source of heat are widely dilated. These receive much more blood than before, even to the extent of four or five times as much; consequently much less blood will flow into the underlying muscle which receives its blood from the same source. Indeed so great is the capacity of the surface vessels increased, the blood supply of the muscle must be reduced to a very small amount. If, then, there is too much blood in a muscle, joint, or any part connected with the surface, the amount may be readily diminished by increasing the quantity of blood flowing into the adjacent skin.

The blood-vessels of the skin may be dilated not only by a hot application but by means of the reaction following a cold application, especially when accompanied by vigorous rubbing. The surface circulation may also be increased by simple friction or percussion of the skin, that is rubbing or slapping it. This method, however, would not ordinarily be appropriate as it would be likely to increase the pain which is commonly present when a muscle is congested to such a degree as to require treatment.

Blisters, mustard plasters, and the application of leeches, and all sorts of cutaneous irritants act in the same way, but the best measures are those which leave the skin intact so that the application may be repeated as often as may seem necessary.

The stomach, liver, lungs, and every internal organ, when excessively filled with blood, may be relieved by this same procedure. It is by the operation of this principle that a severe headache may often be relieved by placing the feet in hot water. Immersion of the entire legs, or wrapping them in a flannel blanket wrung out of hot water, is more effective than a

simple foot bath. A large quantity of blood being diverted into the legs, a smaller amount of blood flows to the upper part of the body; its muscles are less distended; and thus the pain pr other symptoms due to too much blood is more or less promptly relieved.

Almost any internal pain will yield quite promptly to a general hot application, such as a hot blanket pack, a hot full bath, a vapor bath, or a hot air bath. The extreme dilatation of the surface vessels, enabling the skin to contain fully one half of all the blood in the body, affords almost certain relief to pain or other distress in an internal part which is due to an excessive amount of blood in the painful part.

Congestions of the upper half of the body and most congestions or congestive pains located within the trunk may be relieved by the application of heat to the lower half of the body, that is to those parts below the umbilicus. The hip and leg pack is a convenient means of making such an application. A hot sitz bath combined with a hot foot bath is another measure useful for the same purpose.

An Important Suggestion.

It will doubtless occur to the thoughtful reader that there is an apparent antagonism between the principles above explained. We have previously shown, for example, that hot applications relax both the surface vessels and those of the internal part connected therewith, and may thus be used as a means of increasing the blood supply of an internal part. We have now shown that hot applications applied to the skin lessen the blood supply of the internal parts, connected by vessels with the surface to which the application is made. Both these facts must be borne in mind. The following general rules are of great importance and must be strictly observed if one wishes to apply hydrotherapy in a thoroughly scientific way:

1. WHEN A HOT APPLICATION IS MADE FOR THE PURPOSE OF INCREASING THE BLOOD SUPPLY OF AN INTERNAL PART, THE AREA COVERED BY THE APPLICATION SHOULD BE SMALL, EXTENDING ONLY TO THAT PORTION OF THE SKIN WHICH IS IN SPECIAL

NERVOUS CONNECTION WITH THE INTERNAL PART CONCERNED.

2. WHEN A HOT APPLICATION IS MADE FOR THE PURPOSE OF PRODUCING FLUXION, OR A DERIVATIVE EFFECT TO RELIEVE SOME INTERNAL RELATED PART WHICH CONTAINS AN EXCESS OF BLOOD, THE APPLICATION MUST BE LARGE, AT LEAST FOUR OR FIVE TIMES AS LARGE AS THE NERVOUSLY RELATED AREA.

For example, for relief of pain in the stomach, the hot application should cover an area from the nipples to the umbilicus, and should extend two thirds of the way around the trunk, and may even cover with advantage a still larger surface. For relief of severe pelvic pain, the hot application should completely cover the legs and the hips. For pain in a finger or in the hand, the entire forearm should receive the hot application.

613.2

POSSIBILITIES OF YEAST.

There are few things with which the housewife has to deal which offers on the one hand so many possibilities and on the other so many perplexities as the use of yeast in the preparation of food. The nature of yeast was for a long time a matter of doubt and speculation but the microscop has revealed the fact that it is a true plant belonging to the Fungus tribe. All plants require warmth, moisture and food in order to grow and the yeast plant is no exception. If we supply it with these conditions it begins to grow and multiply very rapidly throwing off spores which in turn grow and develop other spores. These little spores are of amazing minuteness a single cubic inch of yeast containing as many as eleven hundred and fifty two million of them. Their appearance at first is that of a tiny egg shaped cell which when nature sends out a little bud which grows from the parent cell until another bud sprouts from the end of the new cell. Thus the plant is really a little chain of cells growing end to end. If the yeast is planted in a dough of flour and water it will of its own accord find food for itself the same as do other plants in earth and will thrive and grow until the food supply is exhausted when if fresh food material is not supplied it will die. As it feeds it tears the substances in which it lies to pieces assimilating some of the elements of which the substance is composed for its own use and setting free other elements among other things carbonic acid gas. Warmth and moisture are also essential to its growth the same as to the growth of other plants. It will not grow at a temperature below 32° nor above 90°. Freezing or

boiling temperature will destroy it as such a temperature would any other plant. In short it is so like all other plants that it must be treated very similarly. The best temperature for the growth of the yeast plant is between 70° and 80°. 75° is considered the golden mean. With these few simple facts in mind good food material and a thermometer to test the temperature there need be no failure in securing its proper growth, and propagation. During the process of its growth yeast has the property of exciting fermentation in what ever material it be planted.

Fermentation may be continued through three stages, the first developing into the second, the second into the third. During the first stage which is usually termed alcoholic fermentation the sugar in the fermenting substance becomes changed into alcohol and carbonic acid gas . In the second stage the alcohol is changed into asetic acid, and carbonic acid gas is no longer produced. The third is called the putrefactive stage and its name sufficiently describes its condition.

Although yeast is one active cause of fermentation it is not the only one, however. There are other spores or germs always in the air which can quite as readily start a fermentation. Their conditions can not however be so well regulated as can the condition of yeast. If fermentation takes place in a thick batter or dough of flour and liquid the carbonic acid gas which is generated during the first fermentive stage pushing its way up to get out of the mass lifts it and makes it light. Taking advantage of this fact many useful and palatable foods can be prepared by the aid of yeast chiefest among such foods is bread.

For the preparation of good bread with yeast three things are absolutely essential, good yeast, good flour, and good care. The best and most convenient kind of marketable yeast is the compressed yeast. Such yeast if good breaks off dry and looks white if it appears moist and stringy it is poor.

Liquid yeast; some kind of which almost every housekeeper knows how to prepare are equally satisfactory although sometimes less convenient to use. When good such yeast is light in color, looks foamy and effervescent and has a pungent odor somewhat similar to weak ammonia, and if tasted will have a sharp biting flavor. There are so many excellent liquid yeasts, I shall not undertake to discuss their comparative merits. If the yeast cells are lively and active they will doubtless do their work well whatever the name by which the yeast is known. Essentially the same principles are involved in the making of them all namely the introduction of a small quantity of fresh lively yeast into a mixture of some form of starch and water with or without the addition of such other substances as will promote fermentation and prevent the yeast from souring. Upon these little slips you will find a good recipe for yeast but it is not the only good one. (assistant pass slips) In a previous lesson I have given you reasons why flour of the entire wheat was to be preferred to the ordinary white flour, but whatever flour is used for bread making it should be good of its kind. In general good flour will be sweet , dry and free from any sour or musty smell or taste when made into dough it is elastic and will retain its shape poor flour works soft and sticky when kneaded between the fingers.

Tests for distinguishing between good and poor flour of the entire grain were given in the other bread lesson and do not need repetition here. Given good yeast, and good flour or as we might term it the seed and the soil the first step to be taken in bread making is to plant this yeast seed so it will grow. This may be accomplished in various ways. As fermentation is more sure, more rapid and require s less yeast to start it when set in action in a thin mixture than when introduced into a stiff dough a very common method of sowing the yeast seed is by preparing what is termed a sponge or ferment, and which is in reality a batter of liquid and flour into which a small quantity of lively yeast is introduced. Some cooks use for this sponge the entire amount of liquid needed for the bread adding flour as the batter grows light. first for a thicker batter, and again when this is risen for a dough. Other cooks use only a portion of the liquid needed at first and when the first sponge is well risen add both liquid and flour to make a fresh sponge to which when light more flour is added to make the dough. Other cooks dispense altogether with the sponge adding to the liquid at first the flo ur required to make it into a dough, allowing it to rise once in mass and again after molding into loaves. As to the superiority of our method over another much depends upon their adaptability to the time and convenience of the user. Good light bread may be produced by each method, More yeast or longer time to rise . Before beginning to put the bread together it is wisest to measure out and sift all the flour to be meeded in the bread because they guess at the quantity of material to be used particularly the flour and with the same quantity of liquid use much more flour at one time than at another thus making the

results exceedingly variable. The difference in the absorptive properties of flour makes the quantity needed subject to some slight variations with different brands and grades of flour, but with the same brand of flour the same wquantity should always be used to produce a given amount of bread. Approximately three heaping measures of flour to one of liquid including the yeast will be found a good proportion. To the liquid which should be luke warm, add the yeast if compressed yeast it should be first dissolved in a little milk or water, mingle the yeast well with the liquid then add the flour slowly beating the whole thoroughly in order to well diffuse the yeast throughout the whole. If left in a thin batter this thorough beating will be all that is necessary if made at once into a dough it must also be thoroughly kneaded. Kneading and working the dough is simply the careful scattering of the yeast seed throughout the dough and it should be done so completely that each little atom of flour will have its corresponding celd of yeast. It is desirable in the making of bread to use as little yeast as possible, there are enough yeast cells in one small cake of compressed yeast to propagate new plants enough to make twenty five or thirty loaves of bread. For an ordinary baking of three or four loaves one fourth of a cake of compressed yeast or I-4 of a cup of liquid yeast is ample. Although much more is generally used, A large amount of yeast lessens the time necessary for bread making but the result is less satisfactory.

Whether water or milk should be used for bread depends upon the pleasure and convenience of the user. Milk makes a more tender bread, and one half to one cupful less of flour is required than

when water is used. Bread made with water is however thought to retain more nearly the natural flavor of the grain and is less likely to sour.

When the yeast seed has been carefully planted it must be well and attentively tended and to this end the batter or dough in all stages should be kept at a uniform temperature ranging between 70° and 75°.- To much importance can not be attached to this point as upon this the success of the bread largely depends. Allowing the temperature to range very low one hour and forcing it up by heat the next will have the same depressing influence upon the yeast plant that a frost at night and a hot sun in the morning would upon your tender houseplants. The yeast plant must be as tenderly cared for as any other representative of the plant world. There are many ingenious devices for keeping bread at an equable temperature a very simple one and one is the use of two crocks, inverted , and in a warm room. If in cold weather wrap them carefully in several thickness of warm blankets.

The time required for bread in its different stages to grow light will vary according to the quantity and strength of the yeast used but in general a thin batter is sufficiently light when it is effervesent like yeast throughout. A thicker batter when risen to nearly double its first bulk and cracked over the top. A loaf is sufficiently light when it has doubled its first proportion and when lifted on the hand feels light and aerated, in general the time will not vary greatly about one hour or one and one half hours will be needed. Much bread that would otherwise have been good is spoiled in the kneading by the addition of two much

flour. After the requisite amount of flour has been added to make a smooth dough care should be taken to use as little as possible in addition as to much makes the bread stiff and hard. Very little indeed is needed . The flour generally added to keep the dough from sticking to the board, but it will not stick if it is kept in constant motion. The object of kneading the bread is the complete diffusion of the yeast and bread has been sufficiently kneaded when it is sufficiently elastic to rebound like india rubber when given a sharp poke with the fist.

The lightness of bread after baking depends upon the prefection of the little cells formed in the mass by the carbonic acid gas during the process of fermentation. The sooner these cells are made permenent after fermentation ceases the more light and porous will be the loaf. Although this is largely dependent upon the baking something is also due to the size of the loaf as the heat will penetrate and fix the cells of a small leaf throughout much sooner than those of a large one . Best size for loaves each in separate pan.

There are three objects to be attained in the baking of bread. To cook the starch and gluten of which the flour is composed, to check the fermentation by destroying the yeast plant, which like any other plant is killed by a high temperature, and to render permanent the cells formed by the action of the carbonic acid gas. To accomplish this a temperature upwards of 400 is needed. The fire should be of sufficient strength to keep the oven heated for at least one hour. The heat should increase for the first I5 min. remain steady for the next twenty in when it may be allowed to

gradually decrease. The most perfect test for the heat of the oven is an oven thermometer, which in these days is not a difficult thing to obtain. the best general test of which I know is to place a spoonful of flour in the oven if it browns in 5 minutes the oven is sufficiently hot.

If the oven is not hot enough, the result upon the bread will be that fermentation will proceed in the oven and with such rapidity that the bread may become sour. If the heat be too great the bread will be baked before it is properly risen or a thick burned crust will be produced forming a non conducting covering to the loaf which will prevent the heat from permeating the interior and thus the loaf will have an over done exterior but a raw and dough interior. If however, the temperature be just right the loaf will continue for a little time to enlarge owing to the expansion of the carbonic acid gas, the conversion of the liquid into steam and the vaporizing of the alcohol, the air cells will become firmly fixed and the bread will be light and porous throughout.

A well risen and well baked bread when done may be taken between the hands and compressed and will at once rebound to its first size. Bread should be allowed to become at least 24 hours old before cutting when if good it will crumble easily when rubbed between the fingers. If instead of crumbling it forms a close soggy mass it may be regarded as indigestible. This is one of the reasons why hot yeast bread is so indigestible. (In demonstartion of this fact take a small lump of new bread-)

In brief we have now compassed the process of bread making, there are many little details which need to be observed but with

which I presume most of you are familiar if not I would refer you to the chapter on bread in my book in which you will find everything minutely described. The simplest and easiest form of raised bread is that made with white flour and the novice in bread making will do well to begin on such, however, I do not recommend any one to make white bread their staple article of diet. and they should aim to learn as soon as practicable how to make bread from the entire grain. The same general principles are in volved in the production of bread from entire wheat flours as when made of white flours./ but the whole wheat flours ferment more readily and rise more quickly than do white flours hence need more careful attention and management lest they sour. Breads from whole wheat and graham flours require less yeast and a slower process of fermentation is advantageous. Such breads are lighter if at least I-3 white flour be employed, when bread is made with a sponge the white flour may be utilized for this purpose. These breads require to be kneaded quite stiff, they also require longer kneading and a hotter oven than white breads. Much graham and whole wheat bread is served insufficiently baked probably owing to the fact that being darker in color its crust assumes a brown tint very soon thus deluding the cook into supposing that the loaf is well baked. For thorough baking from I to I I-2 hours or 2 hours is needed according to size of loaf.

Beside bread an innumerable number of other palatable dishes may be made with yeast)

613.2

Possibilities of Yeast

There are few things with which the housewife has to deal which offers on the one hand so many possibilities and on the other so many perplexities as the use of yeast in the preparation of food. As the ~~Dutchman~~ Dutch Boy said "its all very easy when you know how" and the first step in the know how is a study of the yeast itself and the conditions under which it will thrive. The nature of yeast was for a long time a matter of doubt and speculation but the microscope has revealed the fact that it is a true plant belonging to the Fungus tribe. All plants require warmth, moisture and food

in order to grow and the yeast plant is no exception. If we supply it with these conditions it begins to grow and multiply very rapidly throwing off spores which in turn grow and develop other ~~also~~ spores. These little spores are of amazing minuteness a single cubic inch of yeast containing as many as eleven hundred and fifty two million of them.

Sugar seems to be the food best adapted to the growth of the yeast plant. It is not however necessary that it should be cane sugar, If the yeast is planted in any substance containing sugar in its composition it will of its own accord find food for itself ~~in~~ the same ~~[illegible]~~ as do other plants in earth and will thrive and grow until the food supply is exhausted when if fresh food

material is not supplied it will die. Warmth and moisture are also essential to its growth the same as to the growth of other plants. It will not grow at a temperature below 32° nor above 90° ~~and only slowly at a temperature of 46°~~. Freezing or boiling temperature will destroy it as such a temperature would any other plant. In short it is so like all other plants that it must be treated very similarly. The best temperature for the growth of the yeast plant is between 70 and 80°. 75° is considered the golden mean. With these few simple facts in mind, good food material and a thermometer to test the temperature there need be no failure in ~~the~~ securing its proper growth, and propagation. Just planted in an inkstand a batter of flour and water, being thus supplied with the necessary conditions begins to grow and

During the process of its growth yeast has the property of exciting fermentation in what ever material it be planted.

in the process of growth excites fermentation. Fermentation ~~of which the yeast is the active cause~~ is a decomposing process during which some of the nutritive material in which the fermentation takes place is destroyed.

Fermentation may be continued through three stages, the first developing into the second the second into the third. During the first stage, ~~or which~~ which is usually termed alcoholic fermentation the sugar in the fermenting substance becomes changed into alcohol and carbonic acid gas. In the second stage the alcohol is changed into acetic acid, the active principle of vinegar and carbonic acid gas is no longer produced. The third is ~~what is~~ called the putrefactive stage and its name sufficiently describes its condition ~~although yeast is an exciting cause of fer-~~

Although yeast is ~~an~~ one ~~exciting~~ active cause of fermentation it is not the only one however there are other spores or germs always in the air which can quite as readily start a fermentation. Their conditions can ~~vegetation it is not the only means~~ not however be so well regulated ~~as in yeast~~ as can the conditions of yeast. If fermentation takes place in a thick batter or dough of flour and liquid the carbonic acid gas which is generated during the first fermentive stage pushes its way up to get out of the ~~dough~~ mass lifts it and makes it light. ~~Housewives~~ taking advantage of this fact many useful and palatable foods can be prepared by the aid of yeast chiefest among such foods is bread.

613.2

THE POSSIBILITIES OF YEAST.

If we give careful heed to all the points we have learned in regard to the growth and care of the yeast plant we can make use of yeast to manufacture a great variety of excellent articles. The first and chiefest of these is bread? Bread to be made light by fermentation requires three essentials, good yeast, good material and good care. - [describe each.]

Measurement. - The material for making fermented bread needs almost as careful measurement as for the unfermented breads. One of the great reasons why housekeepers fail in producing good bread is that they guess at the amount of material, and sometimes with the same quantity of liquid they will use a considerable more flour than at another time and the results will be very variable. With the same brand of flour the same quantity should always be used to produce a given amount of bread. There will need of variation in the amount used, sometimes with different brands of flour and different processes of milling, since there is variation in the absorptive properties of flour, but the variation is so slight that if one keeps in mind the approximate amount required for a given amount of wetting it will be very easy to ascertain with one or two trials the exact amount necessary for the particular brand used and then this amount should be carefully measured out and that and no more used for the baking. It is estimated that I00 lbs flour will produce I50 loaves and in general it is calculated that for one scant quart

languid for any thing but dozing and lounging and the day that should have realized some advancement in spiritual growth is worse than thrown away. Poor is this all, the evil effect of the indigestion occasioned are apt to be felt for several succeeding days, making the children iritable and cross and the older members of the family nervous and impatient, most certainly an opposite result from that which should follow a sacred day of rest. Physiologically considered, such feasting is wrong. The wear and repair incident upon hard labor calls for an equivalent in food but there is no necessity for but a very moderate allowance when the day is one of rest and that should be selected from those foods easy of digestion.

The art of cookery is a subject so broad I can not begin to compass it in a fifteen minutes paper Its results whether good or bad reach out over so broad a field that it influences the lives of all mankind and I can only hope the few suggestions I have offered will aid you to a helpful discussion of the subject.