

food

EATING FOR HEALTH
AND EFFICIENCY

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talking to-morrow." - Dr. John Harvey Kellogg

Reading for Health
and Efficiency

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WHAT TO EAT

"A man is made of what he eats, and so what one eats to-day is walking around and talking to-morrow," is one of Dr. Kellogg's health slogans.

The human body is an engine, a self-regulating, self-repairing mechanism. Food is fuel. It is thus the source of heat and energy, like the fuel of a power plant and, of course, foods differ in fuel value, just as do other combustibles.

But foods are more than fuel. They supply other things needed to keep the body machine in good repair and efficient operation.

FOOD CHEMISTRY

All foods are made up of a few simple constituents. These are

Carbohydrates	Salts
Fats	Vitamins
Protein	Cellulose

Carbohydrates

These are food constituents which are composed of carbon (C) and the elements which form water, hydrogen (H), and oxygen (O). Carbohydrates comprise starch, sugar, dextrin and acids.

Starch

This element is found in raw foods in the form of grains inclosed in a thin shell of cellulose, which bursts when the starch is cooked, as in the popping of corn. Every food has a different kind of starch. The chief sources of starch are the cereals (bread and breakfast foods, Irish and sweet potatoes, beans, peas and lentils.

Fruits and green vegetables contain very little starch and the same is true of most root vegetables.

Raw cereal starch is digestible, but the starch of uncooked potatoes is almost wholly indigestible.

When starch is heated, it becomes soluble. This is dextrin. Ordinary paste is a mixture of starch and dextrin.

Sugar

There are numerous sugars, differing in sweetness and solubility and in nutritive properties. Ordinary, so-called cane sugar, is derived from the sugar cane, sorghum and the sugar beet, and the maple tree. It is the sugar of molasses, which was formerly the chief constituent of candies.

Glucose prepared from cornstarch is now largely used in candies and sirups. It is much inferior to cane sugar in sweetness.

Fruit sugar or levulose is sugar found in fruits and in honey. It is the sweetest of all the sugars.

Malt sugar is produced in the sprouting or malting of grain. It is also produced in the body in the process of digestion. It is one of the most wholesome of all the sugars and is absorbed four times as quickly as ordinary cane sugar. All the starch and dextrin eaten are converted into malt sugar by the process of digestion.

Lactose or Milk Sugar. This is a remarkable sugar found only in the milk of animals. It is absorbed slowly and because of this is useful in protecting the intestine, especially the colon from infection by disease germs, because these germs which cause colitis and other infections, and give rise to putrefaction, do not thrive in the presence of milk sugar. For this reason, lactose and Lacto-Dextrin are employed to "change the intestinal flora."

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The best protein is found in nuts, milk, eggs and the soy bean. Ordinary beans are rich in protein. Gluten bread contains about equal parts of starch and gluten. Ordinary bread and other cereals contain a good proportion of protein.

Food Acids

These are really carbohydrates, although not so classed by the chemist, and are used in the body the same as starch and sugar.

The food acids are citric acid, found in lemons, limes, sour oranges, grape fruit, tomatoes and, to some extent, in most sour fruits; malic acid, found in apples and cherries, and in unripe grapes; and tartaric acid, in ripe, sour grapes.

Besides the wholesome acids, there are found in some foods acids which are not foods and which are more or less harmful. One of the worst of these is oxalic acid, found in pieplant (a poisonous weed unfit for food). Another is acetic acid of vinegar. Others are butyric acid, which gives the "strong" odor to rancid butter and other fats; the tannic acid of tea and coffee and benzoic acid found in cranberries.

Fats

The chief sources of fat are - milk, dairy butter and cream, and other vegetable oils, ^{olive} and nuts. Egg yolk is rich in fat. Tallow and lard are less easily digestible than good dairy butter and vegetable fats.

Protein

This element is represented by the curd of skimmed milk, the gluten of wheat, the lean of meat and the white of egg.

The Salts

This class comprises not only common salt, but lime, iron, phosphorus, iodine, copper and other of the chemical elements needed by the tissues. These salts are chiefly found in the envelopes or bran of wheat and other cereals, in greens, nuts and root vegetables. They are either absent or present in insufficient quantities in fats, oils, starch, sugar, fine flour, egg white, polished rice, many breakfast foods, pastry, candies. Lime is almost wholly lacking in meat and iron is deficient in milk.

Vitamins

These are subtle substances found in natural foods which in a most wonderful way control and regulate the growth, development and activities of the body. The accompanying table sums up the chief facts known about these food essentials:-

(Table of vitamins)

Cellulose

This is a product which in the vegetable world forms supporting and protecting structures, such as the trunks, stems, branches and barks of trees and shrubs, and the envelopes of seeds. Cellulose is indigestible, but serves a useful purpose in giving necessary bulk to the food to secure good elimination.

The chief sources of cellulose are bran, whole grain preparations, the seeds and skins of fruits, greens, lettuce, cabbage, celery and fresh vegetables of all sorts. Agar is cellulose, but less efficient than bran.

The Five Food Laboratories

To be absorbed and utilized, the food must be made liquid^{by digestion}. This wonderful work, still a mystery to the greatest scientists, is performed in a series of laboratories arranged along the alimentary canal. They are five in number, the mouth, the stomach, the liver, the pancreas, and the intestine.

The Five Food Solvents

Each food laboratory supplies a digestive fluid which has a specific work to do upon the food.

The mouth produces the saliva which digests starch, converting it into sugar.

The stomach produces the gastric juice with pepsin and hydrochloric acid, which digest protein and disinfect the food.

The liver produces the bile which digests fats and otherwise aids in digestion.

The Pancreas produces the pancreatic juice, which digests starch, protein and fats, and does the work better than do the saliva, the gastric juice and the bile.

The small intestine produces the intestinal juice which digests all the digestible elements of the food, including cane sugar.

~~The Ten Digestive Processes~~

While there are only five food laboratories and five digestive fluids, there are ten digestive processes.

WHAT TO EAT

THE ITINERARY OF A BREAKFAST

- 7:30 to 8:00 A. M. Thorough mastication of each morsel of the food.
- 12:30 P.M. Stomach digestion completed. The food arrives at the lower end of the small intestine. The process of digestion and absorption is going on rapidly.
- 1:00 P.M. The taking of dinner causes the ileocecal valve to open and the food begins to pass into the colon.
- 4:00 P.M. The residues of the breakfast reach the right side of the colon.
- 6:30 P.M. The taking of supper gives the colon a new stimulus and the residues are moved on to the lower part of the colon in readiness for evacuation.
- 10:00 P.M. Evacuation of the food residues on going to bed.

THE TEN STEPS IN THE DIGESTION AND UTILIZATION OF FOOD

The transformation of food into human beings, brains and muscles, thinking, working, pleasuring, suffering, is a veritable transfiguration. Leaving out minute details, here are the ten principal steps in this marvelous transmutation:-

Mouth Digestion

The mouth is a mill. The teeth are the millstones. The time required of for the proper grinding of a meal is 20 to 40 minutes. Every particle of food should be reduced to a semi-liquid state or purée before swallowing. Do not flush the food into the stomach with liquids. Prolonged chewing is necessary, not only to grind the food, but to mix the saliva with it. Saliva is needed not only to soften the food, but to liquefy the starch and to convert it into sugar. This prepares the food for the action of the gastric juice.

Thorough chewing is likewise necessary to afford opportunity for complete testing of the food, which not only affords pleasure to the eater, but sends out along the nerves energizing thrills, which set all the digestive glands to work, pouring out their magic-working digestive juices, and start up in the intestine propulsive, peristaltic waves which push the food residues in the colon along toward the exit. So thorough mastication of the food not only aids digestion, but increases satisfaction, and promotes normal bowel action.

Deglutination or Swallowing

The passage of the food from the mouth to the stomach is ^{not} comparable to the dropping of something through a vertical pipe. The oesophagus, or gullet, is not an open tube. When the food leaves the mouth, it is seized by muscles at the back of the throat and gradually pushed and

squeezed along until it reaches the stomach, where it pauses a few seconds for the opening of the muscular gate which guards the entrance to the stomach.

Indigestible and unpalatable substances are not easily swallowed because the nerves at the back of the throat inspect everything offered before accepting it, and reject indigestible and unwholesome things. It is for this reason that bitter pills are sugar coated.

When food is thoroughly masticated, the food inspector at the back of the throat has a better opportunity for examining it and protecting the body by rejecting unwholesome things. The inspector also renders an important service by telling us when we have eaten enough if we give opportunity for chewing thoroughly.

Gastric Digestion

In the stomach, the food is disinfected by the hydrochloric acid of the gastric juice. The digestion of protein begins, but is not finished. Nearly a quarter of an ounce of hydrochloric acid is required for the digestion of an ordinary meal. An excessive accumulation of acid is prevented by the entrance into the stomach of alkaline fluids from the small intestine neutralizing the acid. Sometimes the pylorus, the muscular valve at the outlet of the stomach, closes too tightly, thus preventing the neutralizing and acid-regulating function of the stomach. This permits acids to accumulate and causes hyperacidity, or so-called "sour stomach." The food remains in the stomach until the digestible part has been liquefied. This usually requires about four hours.

Peristalsis

When food enters the stomach, regular waves of contraction begin. These waves pass over the stomach at the rate of about three to five per minute. The effect is to thoroughly mix and to churn the contents of the stomach.

At frequent intervals, the pylorus, the outlet of the stomach, opens

and allows a teaspoonful of the liquid contents of the stomach to pass out. At the same time, some pancreatic juice and other alkaline fluids from the intestine pass back into the stomach.

Peristaltic waves that pass into the stomach, pass along the whole intestine, mixing the liquid material in the intestine and gradually moving it along the twenty-two feet length of the digestive tract.

These peristaltic waves extend ^{ing} to the large intestine, are particularly active during the process of chewing the food.

Intestinal Digestion

In the small intestine, the food is brought in contact with three digestive fluids, the bile, the pancreatic juice and the intestinal juice. The action of the gastric juice is suspended as soon as the food enters the intestine, the acid being neutralized by the alkaline intestinal fluids and the pepsin rendered inert. In the intestine, the greater part of the digestive work is done.

Absorption

Very little food is absorbed from the stomach. In the small intestine, absorption is very rapid. The absorption process takes place very rapidly by the aid of villi which present an absorbing surface of several square feet. The total amount of liquid absorbed by the intestine is more than six quarts.

The time required for complete digestion and absorption of food is much less than was formerly supposed, averaging about eight hours. By the end of this time, sometimes at the end of five or six hours, or even less, the digestive process is complete, and the indigestible residues have been pushed along out of the small intestine into the large intestine. In this part of the intestinal tract, absorption is very ^{limited} slow, being only about

one-twentieth of that which occurs in the small intestine. The colon is not really a digestive organ. Its function is to receive and dispose of indigestible food residues and wastes.^{body}

It may thus be said in relation to the functions of the stomach, the small intestine and the colon, that the stomach is the kitchen of the body, the small intestine the dining-room, and the colon the garbage receptacle, or sewer.

Liver Digestion

When the food is absorbed from the intestine, it is not yet quite ready for distribution throughout the body, and so is passed through the liver, which gives to several of the digestive processes the final touches of perfection necessary to prepare the various elements of the food to meet the requirements of the tissues.

The liver, likewise, inspects the materials brought to it, retaining or destroying poisons, and converting virulent poisons into harmless or much less dangerous substances, and preparing them for elimination by the kidneys.

Assimilation

The completely digested foods from the liver pass into the general circulation and are distributed throughout the body. By a digestive process the reverse of that which takes place in the stomach and intestine, the liquid food is converted into living tissues. Each tissue builds its own structure, the raw material of which is selected from the blood stream, which constitutes a sort of traveling market, in which each cell and tissue finds just what it needs to keep itself in good repair, and to enable it to do its work.

Ash Elimination

Foods, like other fuels, after being used, leave ashes and other residues. In the case of ordinary fuels, solid residues are left behind in the form of ash, ^{the} and gaseous residues, passing out through the smoke stack. The body eliminates its gaseous residues through the lungs. The solid residues which result from the processes of disassimilation taking place in the tissues, are washed out of the tissues by the blood, from which they are removed chiefly by the kidneys, and discharged in the urine. A portion is removed by the liver and discharged through the bowels, in the bile. The colon also eliminates certain metallic wastes, such as lime and iron.

The character of the ash left by foods after being burned in the tissues, varies greatly, according to the natural constituents of the foods. A food which when burned outside of the body leaves an alkali ash, will leave alkali residues in the body; while a food which leaves an acid ash when eaten leaves acid residues in the body. The importance of this fact has only recently been appreciated. An excessive intake of acid ash food is highly injurious. Such foods should be avoided as much as possible, for they lower the alkalinity of the blood and thereby lessen the ability of the tissues to resist disease; irritate the arteries, and thus produce high blood pressure and arteriosclerosis; wear out the kidneys prematurely, giving rise to Bright's disease, hardening of the liver and other degenerative processes.

Evacuation of Food Residues

By the end of eight hours after the food is eaten, the processes of digestion and absorption are complete, and the indigestible and unusual residues have been deposited in the colon, the body sewer, and, being of no further use to the body, should be promptly disposed of by evacuation.

When these residues are allowed to remain for twenty-four hours or more putrefaction takes place and poisons are formed and absorbed into the blood stream. The mucous membrane of the colon becomes congested and irritated by contact with these poisonous substances. Colitis results and sometimes ulcers are formed, and not infrequently ulcers develop into cancers. Bilioussness, so-called "auto-intoxication", headaches, chronic fatigue and so-called "nervous exhaustion", skin eruptions, halitosis, or foul breath, and numerous other ailments and inconveniences, are among the lesser evils resulting from prolonged retention of foodstuffs in the colon.

Normally, the bowels move after each meal. This is the natural result of the increased activity of the colon which takes place during the eating of a meal, the so-called gastro-colic reflex. When the colon is emptied after each meal, the residues will be retained less than twenty-four hours. The residues of a breakfast may be dismissed before retiring at night. This gives no opportunity for putrefactive changes in the colon and the auto-intoxication which results.

When the bowels move but once a day, the food residues remain in the colon for two or three days. The result is an accumulation of the residues of ten or twelve meals, or even more; whereas, the number of residues found in the colon at one time should never be more than two or three.

Constipation is one of the worst curses of our civilization. It is the direct cause of many diseases and a serious obstacle in the way of recovery in nearly all diseases.

By proper regulation of the diet and the use of harmless food accessories, constipation is curable in all cases except those in which mechanical obstruction exists. Such cases require surgical interference.

Laxative Foods

In ordinary cases of constipation, prompt relief should be experienced

QUESTION BOX LECTURE IN THE SANITARIUM PARLOR, OCTOBER 28, 1928

By

JOHN HARVEY KELLOGG, M. D.

QUESTION: Why is there so much gas and distress from taking Lacto-Dextrin?

ANSWER: Because there are certain bad germs in the intestine which are gas formers. The bad germs that we want to get rid of are the so-called Welch's bacillus which makes gas in enormous quantities. This is the germ that produces gas gangrene which was the cause of the death of so many soldiers in the war. This germ is always found in the colons of flesh eating animals and in decomposing meat. When a person has a bad flora these germs are found present in the intestine in large numbers. When Lacto-Dextrin is given the first effect is to cause the Welch's bacillus to grow very rapidly because it is very fond of this particular food, but when it does this it stops making poisons. It makes gas but does not make poisons, and so there is some improvement, although the gas may be an inconvenience. But at the same time the lactic acid forming germs are also growing and they produce acid, and the acid that is formed makes it impossible for the gas forming germs to grow. So when a person takes Lacto-Dextrin and finds a good deal of gas produced, if he will just suffer the inconvenience for a day or two and keep right on taking the Lacto-Dextrin, after three or four days the gas will diminish and as the flora is changed it will get less and less and finally will disappear entirely.

QUESTION: Is it true that moderate smoking of cigaretts is not harmful?

ANSWER: It certainly is not true. It is of course true

that few cigarets are not so bad as many. It is also true that a few snakes would not produce as much harm as a lot of snakes. The objection to the cigaret is the nicotine, chiefly; but there are a dozen other poisons besides nicotine in the cigaret and all these poisons are mischief making. There is no such thing as denicotinized tobacco. The use of the term denicotinized in connection with tobacco is a lie and the people who publish this to the world know it is a lie; they know it is not true because they do not dare to say upon the package "This tobacco contains no nicotine." They publish it under the name of denicotinized cigars. They say "The bulk of the nicotine is removed from these cigars." A cigar which contains nicotine in any quantity at all is not denicotinized. A cigar that is denicotinized contains no nicotine at all. There is no such thing as denicotinized tobacco. No method has been discovered of taking the nicotine out of tobacco without at the same time destroying the tobacco. If the nicotine is all taken out of the tobacco nobody would want to use it. People would rather smoke dried corn husks or alfalfa.

QUESTION: What is the ideal time and ideal number of daily evacuations?

ANSWER: The bowels should move after ever meal. If you eat four times a day the bowels should move four times a day.

QUESTION: I am inclined to want to sleep right after dinner and sleep until seven o'clock in the morning. Does this indicate a toxic condition?

ANSWER: That indicates that when you take your dinner the blood runs down in your stomach and it is all needed there to digest your dinner and recedes from your brain and that is what makes

you sleep. People who eat too much usually sleep after meals and sometimes people who are feeble, who are anemic, who have not as much blood as they ought to have, when they eat they are likely to find themselves drowsy after meals because they have not enough blood to supply both the stomach and the brain.

QUESTION: Are fish and chicken particularly harmful?

ANSWER: Yes, they are just the same as other meats.

Fish are particularly bad because they undergo putrefaction so readily. It is always to be remembered that the chief objection to the use of meat is the fact that the residues of the meat undergo putrefaction in the colon so readily it feeds the unfriendly germs. The great objection to meat is what happens to the undigested residue, which amounts to one-seventh of the meat eaten. This undergoes putrefaction in the colon and it is the product of this putrefaction that does the harm.

The chicken is a scavenger as well as the oyster and the fish. Most fish are scavengers. Chickens will eat anything that comes along. We have our chickens shut away and we are very careful not to give them a particle of meat and they are not ever given anything that is objectionable in any way. Our chickens never come in contact with anything that is fermented or putrefied and as a result we have remarkably healthy chickens. We lose very few of the hatchlings. Some time ago we had a thousand chickens hatched out and they were all reared to become good sized chickens with the loss of only four. The usual proportion is very much greater than that, as you know, 25 or 30 per cent.

QUESTION: Is it true that goldenrod produces hay fever?

ANSWER: The pollen of all plants, as a matter of fact,

even apples and fruits of various sorts and flowers of various kinds, the pollen of all plants may be a cause of hay fever.

QUESTION: Should carrots be peeled before cooking or is there food value in the peeling?

ANSWER: The skin of the carrot is very thin, and it can be brushed off very easily. Carrots do not require peeling. Peeling will remove some wholesome material from the carrot. It does not spoil it but it simply occasions a loss.

QUESTION: What do you think of saccharine?

ANSWER: Saccharine is a coal tar product. It is more or less toxic. When used in minute doses it can be used for a long time without harm, but experiments made by the French government indicate that when used for some time it produces a depressing effect upon the heart.

QUESTION: Are peanuts a wholesome food?

ANSWER: Peanuts are a useful food, a thoroughly good food because the protein of the peanut is equal to the protein of meat in value; in fact, experiments made not long ago and reported by Dr. Sherman in his excellent work, "The Chemistry of Foods", show that peanuts can take the place of meat and are superior to meat in maintaining nutrition in animals. It took less peanut protein to support the animal in^a good healthy condition than meat protein, so it is a better protein.

QUESTION: Do you regard oatmeal as a desirable breakfast food?

ANSWER: No, I am sorry to say I do not regard it as the best breakfast food. It is a good breakfast food as breakfast foods go; perhaps as good as any, but it is not the best breakfast food because it contains too much phosphoric acid and tends to acidify the blood and render

the urine highly acid. Breakfast foods should not be made the staple article of diet. We should eat more potatoes and less bread. I eat no bread and no breakfast foods. I live almost entirely upon such foods as lettuce and cabbage and turnips and spinach and fresh vegetables in general and fruits and a small proportion of nuts. I should think I eat a couple of ounces of nuts every day and the nuts insure a sufficient amount of protein. Malted Nuts, nut cream or pecans or almonds or any other sort of nuts are wholesome.

QUESTION: What is the cause of dark circles under the eyes?

ANSWER: Venous congestion in the large vessels which lie just beneath the skin about the eyelids.

QUESTION: What is the best treatment for a cold?

ANSWER: The best treatment is to go out of doors and stay there until you get well. That is the best treatment. People who live out of doors do not have colds at all. If you sleep out of doors at night you are not likely to have colds. Everybody ought to sleep out of doors or on a sleeping porch every night of the year. I never sleep in the house if I am not compelled to.

QUESTION: Please explain the use of the test meal.

ANSWER: Well, the test meal is for the purpose of finding out whether your stomach has retired from business or not and whether it is doing business in a proper way. The principal thing the test meal tells is whether your stomach is emptying at the proper rate and whether the hydrochloric acid, which is a very essential element of the gastric juice, is being produced in proper quantity. Those are the most important things we learn from the test meal. The fractional test meal is necessary for complete information. The test meal at the present time

consists of five ounces of strained oatmeal. Fifteen minutes after it is swallowed a portion is withdrawn and it is tested not only for hydrochloric acid but also for sugar, and this test is repeated every fifteen minutes until there is no longer any sugar found, because when sugar is present that shows that there is still some starch in the stomach; there is still some small portion of the meal left there. The test also sometimes shows bile. That does not mean anything wrong at all. It means simply that the fluids of the intestine are coming up into the stomach in a normal physiologic way, for it is now known the bile naturally comes into the stomach in small quantities. This is necessary to regulate the acidity of the stomach.

QUESTION: Where can one get soy beans to plant?

ANSWER: The soy bean has been for thousands of years the beefsteak of China. The average Chinaman eats less meat in a whole year than the average Englishman eats in a week. The soy bean contains everything useful that meat contains. There is nothing in meat which is useful that you cannot find in the soy bean, and there are some good things in the soy bean that are not found in meat to any extent, so the Chinaman by eating the soy bean gets along without meat very well. He takes the soy bean, soaks it a while, crushes it into a pulp, boils it for three quarters of an hour, then adds plenty of water and put a little gypsum or a little citric acid in it and then strains it through a cloth. As a matter of fact he strains it first through a cloth and then adds the gypsum and strains it again, and in doing this he gets a curd similar to the curd of cheese; and with this curd, which he calls to-fu, he makes cheese and makes macaroni and a great variety of other things which are very similar to the preparations made from milk. He can make milk;

in fact, he sets the milk aside and cream will rise on it. He allows it to sour and has soy bean buttermilk. It takes the place of milk and meat and to a large extent also of eggs in China, so it is a very useful thing.

The United States government has introduced into this country and tested more than a thousand different varieties of the soy bean. It is a very wonderful plant and you can find some variety of it suited to almost any locality in the United States. There are some varieties raised even as far north as Canada. One particular variety is adapted to each particular locality. Some require a longer season than others. It requires a rather long season and has to be planted early in the spring.

QUESTION: The English are great beef eaters. How do you account for their vitality?

ANSWER: The English are not such great beef eaters as you think. Some Englishmen are great beef eaters. The people who live in the towns are. The people who live in the towns are great beef eaters, but, as a matter of fact, the people who live in the country eat very little meat. They raise beef to sell, not to eat. I have taken pains to investigate the matter. Forty years ago I spent some months in Birmingham, England, with the famous Dr. Lawson Tait who was at that time the greatest abdominal surgeon in the world. His patients nearly all recovered while other surgeons lost a good many of their cases. In this country the mortality was about 20 per cent. at that time, but Dr. Lawson Tait had a record of 116 cases in succession without a death. So I went over and spent several months with him.

While there I had occasional opportunities to run out into

the country to study the peasantry and inquired into their habits. They worked from sunrise until dark. Every house was a workshop. The women worked and the children worked. I found a little woman hammering away making nails for camels' shoes to be used in Arabia. This little woman worked from sunrise to sunset every day to earn nine shillings a week by this hard labor. Even the little children had toy tools and they were learning to make camel's nails and horseshoe nails.

I found these people remarkably hardy. I was in the brickyard where the women engage in making brick and I saw there a woman kneading the clay with her hands, doing it all by hand instead of machinery. She was kneading a large mass of clay, a mass as big as a very big cannon ball, rolling it over, kneading it and tossing it in her hands. I thought it was different from the clay I was accustomed to use at home. I tried to lift it myself and found I had to tug very hard to lift it off the table. It weighed 60 or 70 pounds. She was rolling it about and tossing it about as though it were a ball. She was about forty years of age she told me. I asked her how long she had worked in this brickyard. She said that she was born in the brickyard, almost born there. "My mother worked here until the day before I was born and she was back here a week later, and I have been working here ever since I could walk."

After the woman got through with the clay, had it thoroughly kneaded, a fourteen year old girl, a slight looking little girl, came along and threw it on her head and ran away with it to the molders who were going to put it into molds for fire clay.

I inquired about the eating habits of these people very carefully. I said to the woman, "How often do you have beef?"

How often do you have meat?"

"Oh," she said, "I never eat meat. Sometimes we have a soup bone on Sunday."

I asked the hired girl at the place where I lived if she ate meat. I found she was reared in the country. She said her father was a farmer. I said, "How often do you have beef?"

She said, "We never eat beef except perhaps on New Years Day or Thanksgiving. We raise beef to sell. We sometimes have a bone for soup on Sunday, never more than once a week."

The average Englishman does not eat so much meat. It is the man who lives in the city who eats meat. People who live in the city and wealthy people eat meat, but even the poorer classes in the city do not eat so much meat, although they eat more now than they did fifty years ago.

Dr. James made a study of this subject some years ago and he found cancer had increased in England at the same rate that meat eating has increased. He found they ate about ten times as much meat at the present time as they did fifty years ago and they had about ten times as much cancer. So I think, and there are a large number of doctors who are convinced, that meat eating has quite an important relation to cancer. At least Dr. James made this suggestion.

Dr. Leatherby years ago said the average Irishman eats less meat in a whole year than the average Englishman eats in a week, and there are four or five times as many centenarians in Ireland as there are in England and more than in any other part of Europe except Bulgaria.

QUESTION: Is there such a thing as a denicotinized cigar?

ANSWER: No. The only way to get the nicotine out of tobacco is to destroy the tobacco. When you get the nicotine out the tobacco is

destroyed. You cannot get the nicotine out of tobacco. You can take part of it out, but the best that has ever been done is to get three quarters of it out. There is enough left so that the smoke from denicotinized tobacco contains as much nicotine as any tobacco smoke contains. It does not lessen the amount of nicotine in the smoke and it is the smoke that does the harm.

There is an attempt, I might say, being made to compel the Battle Creek Sanitarium to help in the introduction of these fraudulent products. One of these manufacturers has sent out a letter saying that a Battle Creek doctor recommended these denicotinized cigars. There are quite a number of doctors in Battle Creek. I wrote to the company and compelled them to admit that it was not a Battle Creek Sanitarium doctor who recommended denicotinized cigars, and to send out to the public such a letter gives the impression that a Battle Creek Sanitarium doctor recommended these cigars, which is not true.

QUESTION: Is carbonated water harmful?

ANSWER: No, it is not harmful provided it is clean water.

QUESTION: How does it happen that a little handful of English soldiers in India, some twenty thousand, are able to keep order among three hundred million vegetarians? How does it happen that twenty thousand beef eaters can control three million vegetarians?

ANSWER: Well, it does not happen. There are not three hundred million vegetarians in India. There are only two hundred million vegetarians in India; there are a hundred million Mohammedans who are meat eaters. So it seems that these twenty thousand beef eaters are able to keep under control not only two hundred million vegetarians but a hundred meat eating Mohammedans. It is evidently not a matter of diet at all but of something else, I suspect a matter of machine guns.

QUESTION: My hands and feet are always cold. I also have cold sweats. What shall I do?

ANSWER: Get detoxicated. You are toxic.

QUESTION: Have cases of glaucoma been cured?

ANSWER: Yes, glaucoma has been arrested. The eyes may not be entirely cured, but the disease has often been arrested by careful and early treatment.

QUESTION: If the gums have receded from the teeth, is it necessary to have the teeth extracted?

ANSWER: The teeth should be X-rayed and if you find that the teeth are diseased, especially if the roots are diseased, that there are abscesses or infection then extraction is necessary. A competent dentist will tell you about that. Be sure to have your teeth carefully examined. I should say that a person who has receding gums usually has pyorrhea and the pyorrhea means infection of the mouth, so your mouth is always swarming with pus-forming germs and these pus-forming germs are most pernicious. They get into the blood if your resistance happens to be low, and they begin to multiply and spread in the blood and may carry you off suddenly.

Some years ago a colleague of mine, an able fellow who was very ambitious, was unwise enough to follow my very bad example to work nights. He found himself running down and became very thin. His resistance was evidently very low. One morning when he got up he felt a little pimple on his arm not larger than the head of a pin, but it had a stinging sensation in it and pretty soon it began to spread. In an hour or two it was as large around as a thimble and in two or three hours more it spread up to his shoulder and continued to spread and spread all

over his body and in a couple of days his blood was found to be swarming with bacteria and in three days he was found dead in spite of everything that could be done for him.

QUESTION: Should tonsils that discharge pus slightly be removed?

ANSWER: A tonsil that has any quantity of pus is a very dangerous thing to have about and should be gotten rid of as soon as possible. Pus is always dangerous, and if you have pus in the tonsil that means your resistance is low. Your tonsil is unhealthy otherwise pus would not be present in it. The pus would be destroyed. It would not be tolerated if your resistance were not so low that you are not able to destroy it.

QUESTION: What does Savita consist of?

ANSWER: Savita is an extract of a special variety of yeast which is produced in Germany. As the result of long experiments a yeast has been developed which has a mushroom flavor and this flavor is extracted, or rather the yeast is subjected to a process by which an extract is made from it and this extract contains the entire useful part of the yeast cell. The yeast cell consists of a little envelope of cellulose and its protoplasmic contents. The contents of the cell are all extracted. It has wonderful properties. Among others it has an agreeable flavor, which makes it attractive, and the important vitamin B and other vitamins. Vitamin D is found to be present in very considerable amount. Vitamin B and vitamin D are very important vitamins which are necessary for promoting growth and maintaining vitality.

QUESTION: When the tonsils are taken out, does this cause

a deficiency to the body in any way?

ANSWER: One never should take out a healthy tonsil. So long as the tonsils are of use to the body no doctor would think of removing them, and so far as the tonsil being missed is concerned this is not a very serious matter at the most when one has reached maturity. In a child the tonsil seems to have some value in promoting growth and the removal of the tonsil unless it has become diseased might possibly do some harm. For that reason it is not best to remove the tonsils in very young children unless it is found to be very necessary, but in an adult the tonsil is of very little value.

QUESTION: What is the cause of high blood pressure?

ANSWER: Poisons circulating in the blood.

QUESTION: When breakfast and luncheon consist of raw fruit or raw vegetables only and the third meal is a regular Battle Creek meal, are three eliminations daily necessary?

ANSWER: Well, it is better to secure complete evacuation of the colon at least three times a day or after every meal, and all that is necessary is to make these light meals a little more voluminous by introducing psyllium seed or bran or some other roughage of some sort.

QUESTION: What is the cause of osteoarthritis and how is it overcome?

ANSWER: Osteoarthritis is very often the result of focal infection, the absorption of germs or germ poisons from diseased teeth or more frequently from a diseased colon. The colon, which is the seat of colitis, is probably the most common of all causes of osteoarthritis.

QUESTION: Are whole wheat cereals preferable to bolted flour?

ANSWER: Certainly they are. Whole cereals should always be

used. In the use of cereals the whole grain should be employed.

Bolted cereals are always objectionable because in the bolting process some of the most useful elements of the grain are moved. The vitamins and the salts, phosphorus, lime and iron are nearly all in the coating of the grain and when these are bolted out what is left is the starchy interior which is lacking in the iron and the lime and the phosphorus and the vitamins which are very essential elements of the grain. If I were dictator in this country I would prohibit the manufacture of fine flour altogether. Mussolini did this some time ago in Italy, and I have no doubt the people of Italy will greatly profit by it. He forbade entirely the sale or manufacture of white flour in Italy and a short time afterwards the King of Belgium took the same action in relation to his country. It would be a fine thing if we could have laws of this sort in this country.

QUESTION: If one eats eggs, milk, cream and butter, why not the chicken and the cow as well?

ANSWER: Eat the goose that lays the eggs and then you do not have any more eggs. That is one reason. But it is hard on the chicken and hard on the cow. I was reading some years ago a poem that was written by a Buddhist. A missionary lady brought it to me. She said in her town there was a Buddhist missionary that used to go up and down the streets of the town reciting a poem, and this poem, which she had taken the pains to translate—I do not remember the whole poem, but this was the idea: A cow complained that she was made to plow the rice and had to work very hard but was not allowed to eat any of the rice. If she nipped a little head of rice now and then or a little blade of the growing grain she was punished for it. If by and by they had a famine and rice was scarce they

would actually kill her and eat her. The Buddhist believes in the transmigration of souls. He believes that when he dies his soul will go into the body of some animal. If he has been very, very good then some animal of higher species, but if he has been bad some animal of low species like a toad or a serpent or some other creature. So this Buddhist sang this poem called "The Cow's Lament." The way she ended up was

"When I am a man and you are a cow,

I will treat you then as you treat me now."

So the idea that animals should be eaten is not altogether in harmony with with the esthetics of a great many people. There are millions of people who believe it is a sinful thing to eat a cow. It is certainly inhuman to kill these animals and eat them. It was never intended in the beginning of things. If there was any design about it there is no evidence at all that animals were ever intended to be eaten by other animals.

Professor Elliot tells in his work "Prehistoric Man" that in prehistoric times when man was still in a primitive condition animals were not eaten. They were not eaten either by man or by animals. There was no such thing as a carnivorous animal in the world. Animals were not eaten. All animals went to the original source of food, which is the vegetable kingdom.

While it is true that milk is a food it is not true that flesh was ever intended to be a food. Milk is a product intended for food for young animals; it is not the best food for adults. As a matter of convenience it is an advantage to use milk in order to balance up other foodstuffs. It is a very convenient means of balancing foods. It is much preferable to meat because it is a food which can be used to sustain life whereas meat cannot. Lean meat as ordinarily eaten will

not sustain life for an indefinite length of time. Milk will. Meat is lacking in many important elements. It lacks vitamins and lime. The same is true of the whites of eggs. The yolks are the only part that is really wholesome. The yolk was intended as food for the young chick. You can rob the chick of it and eat it yourself if you will. It contains lime and iron and all the other elements necessary for food, whereas the white of the egg does not.

QUESTION: Is a coated tongue always from the bowels?

ANSWER: Not necessarily always. A white coat on the tongue means low resistance. It may be due to the fact that you have a little fever or it may be due to some other cause. If you have this coat examined by the laboratory you will find it is swarming with colon germs.

Some time ago we made a bacteriological study of the saliva of everybody who came here, made a bacteriological test of the mouth of every person who came to the institution, and we found forty per cent of all the people who came here had great quantities of colon germs in their mouths, so you see what it means to have the whole alimentary canal infected. No wonder these people had coated tongues and a foul breath and were in the most deplorable toxic condition.

QUESTION: Will draining the gallbladder relieve headache?

ANSWER: Sometimes it will. The trouble with the gallbladder usually originates in the colon. Infections of the colon work up and finally involve the gallbladder. The bile contains poisons. It is the most poisonous fluid produced in the body. It is six times as poisonous as urine and 20 ounces of bile are produced every day. The liver produces about half as much bile as urine. About three pints of urine is produced and about half that amount of bile is produced every 24

hours. The bile is six times as poisonous as the urine. When it is poured out into the intestine it is intended to be carried off. When a person is suffering from constipation a large part of the bile is re-absorbed and so in this way it becomes more and more concentrated and when such concentrated bile is taken into the blood it poisons the blood and is the cause of headaches and other symptoms.

QUESTION: Does the diet prescribed when gallstones are found in the gallbladder cause a decrease in the number of red blood corpuscles and in the white ones?

ANSWER: The number of white cells found in the blood does not depend entirely upon the diet; it depends upon other conditions. The white cells are in part sentinals. They are different kinds of cells which have different purposes. Some act as scavengers and pick up waste matter in the lymph vessels and the blood-vessels and some are microbe killers which have for their duty to hunt up and catch germs and destroy them; others have other functions.

The diet has much to do with the number of red blood cells. If the food is lacking in iron the number of red cells will be diminished. Much of our food is deficient in iron. There is very little iron in a potato. There is very little iron in white bread. There is a marked deficiency of iron in many of our foodstuffs. Cane sugar contains none at all. The same thing is practically true of honey and other sweets. Molasses, however, is quite rich in iron and so is maple sugar. So if you are going to use cane sugar in any form you had better use it in the form of brown sugar or molasses instead of in the ordinary form of white crystals as we find it upon the table.

It is not necessary, however to eat meat in order to get

iron, for there are more than two dozen foods, ordinary foods, which contain as much or more iron than is found in beefsteak. Raisins are rich in iron and dates and figs and prunes are very rich in iron. Graham bread is rich in iron. Bran is rich in iron. It contains several times as much iron as beefsteak does. The idea that meat is the only source of iron is quite an error.

It is important to know that there are other things than iron necessary for building blood. The blood cell contains a little copper as well as iron, and it has been recently discovered that copper is almost as necessary for blood building as iron. Iron without copper will often make no change in the blood composition at all, whereas the addition of a minute quantity of copper, about one-seventh as much as of iron, will secure rapid improvement in the blood count. Another substance is necessary, a protein substance which is found in vegetables, especially in the chlorophyll. This substance is very important because it is necessary for making up the hemoglobin of the red cell.

Some interesting experiments have been made in the University of Wisconsin. It was found that lettuce grown in Wisconsin would not make any increase in the blood count. Lettuce that was grown in Tennessee produced very rapid improvement. Investigation showed that the lettuce grown in Tennessee contained a little copper, whereas the lettuce grown in Wisconsin had no copper at all. We have had some tests made of lettuce grown in this vicinity and I was happy to discover that lettuce grown in Battle Creek had more copper in it than lettuce grown on the Pacific coast, Oregon and other regions. This is due, I suppose, to the fact that we have a very rich copper country in the northern part of the State and the soil is well charged with copper.

QUESTION: Is rheumatism hereditary?

ANSWER: No. Neither rheumatism nor smallpox nor insanity nor any other disease, or at least very few diseases, are hereditary, but one may inherit a tendency to a disease. One may have a tendency to rheumatism but he would not inherit rheumatism.

QUESTION: Is vaccination necessary for one who leads a biologic life?

ANSWER: A biologic life will not take the place of vaccination. Vaccination is a simple process and entirely free from danger. The philosophy is really very simple. When the smallpox germs get into the body they at first make no disturbance. There are only a few of them, but they grow and multiply and continue to increase until by and by they produce such a quantity of poison that the poisons begin to produce symptoms, chill and fever, and by and by there comes an eruption because the skin is sensitized to these smallpox poisons and we have the development of pustules upon the skin, a very dreadful eruption in some cases. One of the most terrible sights I ever saw in my life was a person who had the confluent form of this eruption. The patient's face was swollen and the eyes were swollen shut.

When the smallpox poison is first produced the body begins to produce an antidote. This being a new experience, the body at first only produces a very small amount of the antidote; but little by little the body acquires the power to produce more and more and more of the antidote for the smallpox poison and after a while the body produces a sufficient amount of this antidote to neutralize completely the smallpox poison and then the smallpox symptoms disappear and the disease itself disappears; in other words, the patient recovers.

Sometimes the bad effects of the smallpox poisons are so intense that the patient dies before enough of the antidote has been produced to neutralize the poison. That is why some people do not recover from the disease.

Now, it was found many years ago by Jenner that persons sometimes contract what is known as cowpox from cows, and the cowpox in the cow is simply smallpox. In some way in passing through the cow the disease is mitigated. In passing through the cow the disease is modified in such a way that it is not so terrible a malady, ^{as it is} in the original form. It was found that girls who milked these cows contracted the disease and after they recovered were immune against smallpox.

When a person is vaccinated, this is what happens: Some modified smallpox germs obtained from the cow are introduced into the skin. The skin is the part most sensitized to this poison. The germs are planted there and grow and grow and grow and develop and after a certain length of time there is a patch of red on the skin, red and swollen and sore. This person is suffering from smallpox on a small scale. This is simply a little attack of smallpox, smallpox that is confined to an area a couple of inches in diameter. Instead of the germs spreading all over the body as they do in ordinary smallpox, they are confined to this small area because their virulence is so slight that the body is able to produce enough antitoxin to control the disease so the extent of the disease is kept within a small area while the toxin is absorbed into the body and spread all through the body and the whole body is made immune although the germs themselves are confined to this small area. So vaccination is simply smallpox on a very small scale, and it affords nearly the same protection that an attack of real smallpox

affords.

Vaccination is a very beneficent means of protection against a very terrible disease. Two hundred years ago smallpox was a great plague all through Europe.

Oct. 31, 1928.

INSTITUTIONAL CARE OF CHRONIC INVALIDS

1. General good environment.
2. Regulated life and health program.
3. Correct wrong habits.
4. Restoration of normal functions by training - Skin - Cold and light -
Metabolism.

*Correlation of regimen with all
medical and other agencies*

THE INSTITUTIONAL TREATMENT OF CHRONIC INVALIDS

Many years ago (1891?)ⁱⁿ, a paper read before the Pan American Medical Congress held in Mexico City, the writer said,

In the treatment of these cases, it is most important to keep in mind that the object of therapeutic effort should be the patient himself, not his disease.

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(REP. for Mexico.)

THE CURE OF CHRONIC INVALIDS BY REGIMEN AND TRAINING.

THE medical men of the last century talked and wrote about and practiced the treatment ~~of disease~~ and ~~the~~ cure of disease rather than the treatment and cure of invalids. The idea that disease is a thing to be attacked and cured, is one of the corruptions which crept into medicine during the obscurity of the Middle Ages when all science fell into decay, and numerous errors of the most mischievous character gained credence among men. The notion that disease is an entity,--something to be cast out of the body by forcible means, or to be exorcised by magic of some sort, still survives, not only in the wilds of Tartary where the native physician undertakes to frighten off the demon of disease by a warning administered by means of a paper pill bearing the name of the drug supposed to be appropriate for the malady, but which he does not happen to find among the miscellaneous assortment of herbs contained in his leather pouch, but, in countries much more favored and advanced in civilization, and even in the great centers of modern ~~civilization~~. Nevertheless the idea has fully dawned upon the world that disease is morbid action, not a morbid entity; that patients are to be cured, not their maladies.

One of the most characteristic features of the new medical science which has grown up so rapidly within the last quarter of a century, is the idea that health, when lost, is not to be regain-

ed by an ingenious system of medicinal antidoting, seeking by forcible measures to eject an invading enemy, ~~by violent measures,~~ but by the activity of those powers within the body to which the ancients applied the term "vis medicatrix naturae." In the case of chronic invalids at least, this requires the application of such measures, ~~regimen and training~~ ^{education and diet} as shall serve to develop the natural forces of the body; to increase vital resistance; to remove obstacles; to facilitate ~~the~~ curative processes, and to supply those conditions necessary for healthful vital activity by the removal of morbid influences, the correction of wrong habits, and the establishment of a ~~correct~~ ^{wholesome} regimen.

The chronic invalid is sick, as a rule, not because of accident, ~~or~~ adverse climatic conditions, or hereditary predisposition, but, primarily, because of his violation of the laws of health in the cultivation of erroneous habits of life; in other words, he is sick because he has violated the laws of health. The rational medicine to which modern scientific research and discovery have given birth, regards disease not as the result of chance or ~~through~~ the operation of ^{some} any supernatural agency, but as the result of ^{the violation of} nature's laws. To expect that the consequences of physical wrong doing may be remedied or antidoted by the most skillful application of pills or potions, elixirs, stimulants, ~~tonics,~~ tonics, alteratives, or the ^{employment} ~~application~~ of baths, electricity or other artificial means without the removal of the causes ~~of~~ ^{of} morbid conditions existing, is as unreasonable as to expect their

removal by the juggles of the mind-curist, or the blind trustfulness of the faith-healer.

Rational medicine has relegated to the limbo of exploded errors the ~~old~~ faith in the specifics and panaceas of more recent times along with the alchemy and astrology of a more remote age. The laboratory-trained physician recognizes, in the deviations of a bodily function from its normal course, the operation of a disturbing influence, and proceeds to institute a search after the same in the study of the patient's history and his habits of life, and, ~~if need be~~, bring the microscope and the resources of the chemical laboratory to aid him in his research just as does the astronomer when he finds a planet or ^a tellite deviating from its ordinary course, recognize in this fact the evidence of a disturbing cause which he should be able to discover by the aid of the telescope and applied mathematics.

The old theory of inherent perversity, physical, mental ~~and~~ ^{or} moral, if not wholly abandoned, is at least restricted to narrower limits. The list of so-called "idiopathic" ^{hereditary} maladies and morbid conditions is daily growing smaller. Planets do not deviate from their orbits because of any inherent disposition to go astray, neither do human beings fall into diseased conditions through the natural perversity of the ⁱⁿ bodily organs. ⁹ The insatiable inquisitiveness of ^{the} modern mind, the distaste and disrespect for mystery, the eternal questioning, "How," "What," "Why," have dissipated the old illusions and uprooted the old superstitions which for so many

ages held the practice of medicine in the ruts of empiricism and paralyzed the disposition to scientific inquiry. The marvelous discoveries which the world has witnessed within the last twenty-five years, as the result of the self-sacrificing toil of hundreds of patient workers in physiological and bacteriological laboratories, have developed a larger number of distinct facts of fundamental importance than were previously known to the medical profession as the result of ages of unaided clinical observation.

In the light of these modern studies, man ceases to be an altogether unique and isolated creature in the domain of life, but takes his place in the same category with such humble creatures as the monera, the sponge, and the so-called coral insect, even acknowledging kinship with the lichen growing on the rock, and the mold upon the wall.

Physiologically considered, the body is a unit only in the sense in which a family, a community or a nation is a unit. This is a fact which we are quite prone to forget. Each cell, each minute structural element leads an individual, and, in a certain sense, an independent life. It has its own life-history, its own peculiar function, its individual needs. Like every other member of the animate world, it is engaged in the universal struggle for existence, working out its individual destiny while engaged in a constant battle with its environment.

A curious fact which we generally seem to overlook is, that all living things work under water. The fish, the polyp, the tad-

pole, are really no more under water than the adult frog, the bird, the man. Man, as other mammals and birds, with various other orders of living beings, breathe oxygen dissolved in nitrogen, one part to five, while so-called aquatic animals breathe oxygen dissolved in water, one part to twenty-five. The real man, as well as the real fish, is enclosed within a double sac formed by the skin and mucous membrane. This sac is filled with fluid in which live and work, some fixed in definite positions, others floating from point to point, the millions of minute individuals which constitute the community of organisms which we commonly call the body.

Each individual, as it works, takes from the fluid medium in which it lives, the tissue-juices or the blood, the elements necessary to repair its wastes and losses, ~~in the case of certain~~ ^{or} cells, whatever may be necessary to enable it to elaborate its characteristic product. ^{if it be a secreting cell} As each cell works, living at the expense of the various nutrient materials found in the fluid menstruum about it, it also pours out into this ever changing stream two classes of substances, highly elaborated products destined to perform some useful function in the body, -- secretions, and poisonous substances commonly known in a general way as leucomaines.

One of the most interesting generalizations of modern science is, that every living thing produces, by the very processes by which it lives, poisonous substances which, unless speedily removed, re-

the
sult in death ~~of~~ the organism by which they are produced. This
is true not only of the human being as a whole, but of each indi-
vidual cell composing the animal body. Thus, as Bouchard has so
~~graphically pointed out~~, *demonstrated*, the living body is a factory of poisons,
continually producing toxic matters in such quantities that life
is only maintained by the incessant activity of the lungs, liver,
skin, kidneys and the mucous membrane, in the elimination of poi-
sons; and, *as shown* through the results of the most recent laboratory re-
search, we must also add, through the unceasing activity of the
liver, suprarenal capsules, the thyroid and thymus glands, and
doubtless numerous other structures, in the destruction of poisons
or in the production of antidotal substances. It thus appears
that the nutrient stream constantly reënforced by the daily sup-
plies of food and drink which is incessantly passing through the
body, is not an absolutely pure current, but always contains a
varying amount of poisonous substances, the quantity of which is,
by the vital activities of the body, kept down to the level at
which the performance of the *functions* of the body in the normal
way is possible. Every cell, every fiber of the body, must neces-
sarily be influenced in its life processes, in growth, repair,
in its functional activity, by the quantity and the character of
the poisons circulating in the fluid in which it is submerged.
For example, our brain-cells *in other words, we think under water* are submerged in cerebro-spinal fluid.
If this fluid is, to an unusual degree turbid, or loaded with tis-

sue poison, it is evident that we must be able to think with less than usual clearness; and, if this condition of the vital fluid is constant or permanent, then the disturbance of the mental function, or the interference with mental activity will be habitual, and the brain-structure itself must also suffer.

The investigations of Bouchard, Haig, Dujardin-Beaumetz, Rogers and numerous other ~~workers~~ have established upon the most substantial foundation the fact that the circulation in the blood and tissue-juices, of poisons abnormal in character or amount, is the underlying cause of the long list of structural degenerations which result in organic disease of the kidneys, liver, heart, various forms of paralysis, arterio-sclerosis, and premature decay of the vital powers.

The discovery of these important facts has thrown a great flood of light, not only upon the etiology but upon the ~~therapies~~ ^{therapies} of chronic maladies. Traced to their ultimate root, most, or nearly all chronic diseases may be charged to ~~the~~ some vice of nutrition whereby the part affected has been made to deviate from the normal standard of vital activity. Viewed from this standpoint, chronic disease is most generally the result of contamination or other deterioration of the fluid medium in which, ^{and} upon which, the tissues subsist. That the vital currents within us, in which, in a most literal sense, we live and move and have our being, may become ~~turbid or~~ surcharged with poisons, is one of the important

has been - 8 -

facts which ~~is~~ demonstrated by modern physiological studies, and which has been graphically ~~demonstrated~~ *illustrated* by Bouchard and his pupils in their studies of the toxicity of the urine, blood, bile, tissues, juices and other fluids of the body.

There are many ways in which this contamination of the vital stream with poisons may be produced, such as exposure to a poison-laden atmosphere whereby the purifying function of the lungs is interfered with; the absorption of water contaminated with poisons; ~~poisons~~ *the absorption of poisons* in the shape of tobacco, tea, coffee, opium and other toxic substances. But, unquestionably one of the most common methods whereby this surcharge takes place, are, ~~Sedentary~~ *S*edentary life, as the result of which, ~~_____~~

1. Through deficient exercise of the lungs the amount of oxygen received is insufficient to either destroy the tissue-poisons produced, or to so reduce them by oxidation as to facilitate their elimination. And,

2. Such errors in diet as result in the introduction, through the stomach, of poisons in the food, or poisons produced through the fermentation and decomposition of unwholesome articles of diet.

The limits of this paper will not permit me to enter into the consideration of the physiological advantages of exercise as a hygienic measure, or the minutiae of the relations of diet ~~in health and disease~~ to the bodily functions in health and disease. I

only wish to emphasize the importance of these two measures of regimen in reference to those conditions which are of fundamental importance in both health and disease .

With these interesting physiological facts in mind, it becomes readily apparent that the chronic invalid is sick, usually because he has neglected to supply the conditions necessary for health, or because he has by long-continued violation of the laws of health in various unhygienic practices, developed evil tendencies and morbid activities in his various bodily organs. The cure of such a patient must consist largely in a course of systematic training by which he will be educated out of his evil ways into better ones --by which his abnormal vital functions will be trained to normal and healthful activity. This course of training necessarily includes such discipline and regimen as will influence every disordered function. It involves absolute control of the entire life of the invalid. All his habits of life must be systematically conformed to such rules and principles as will efficiently and curatively modify his disordered functions.

This can only be accomplished by placing the patient under circumstances in which his case can be most thoroughly and exhaustively studied, his habits observed and regulated and his whole life controlled. It is very rare that this can be accomplished in his own home. At home, he is constantly exposed to the emergencies of domestic and social life. He is perhaps annoyed by the

vexatious details of business, and has continually before him the temptation to indulge in the habitual errors of habit and regimen which have been the prime factors in producing his diseased condition.

A person's environment and his habits of life constitute ^{the} mold into which he grows. The conditions to which he is subjected, so to speak, train the cell-activities of his body in such a manner as to modify his growth and actually change the structure of his ^{organs} body. Chronic disease ^{is} ~~must be~~ the result of cell-training under the influence of wrong habits and injurious conditions. A very forcible illustration of this is afforded by ^a ~~the~~ very common but only very recently appreciated class of morbid conditions which have for their foundation the displacement of the stomach and other abdominal viscera, a condition comprised under the general name "enteroptosis." Through weakness of the abdominal muscles as the result of sedentary habits and resulting muscular weakness, through bad postures in sitting, or as the result of injurious constriction of the waist in improper dressing, the stomach, liver, kidneys and other viscera become displaced and thereby so hindered in the performance of their natural functions, that grave disease of the organs results, and the patient becomes the victim of neurasthenia with its endless list of symptoms, and many other chronic disorders among which may be included the great majority of chronic ailments, all growing out of the disturbed nutrition resulting from disordered digestion and the abnormal strain upon

the sympathetic centers from the weight of the displaced and pendent ~~weight of the viscera.~~

The radical cure of ^{the} chronic invalid requires bodily reconstruction. The displaced stomach, liver, ^{and} kidneys, must be restored to their normal position; lax muscles must be made tense; weak, irritable nerves ~~are~~ and nerve-centers must be, by reconstructive processes, replaced by sound ones; the stagnant poison-laden fluids of the body must be purified and the vital stream quickened by means of the various processes through which ~~the~~ elimination may be encouraged. ¶ The nerves, muscles, glands, nerve-centers, ^{and} the blood, cannot be reconstructed by means of pharmaceutical preparations. Tonics, stimulants, alteratives, rejuvenants, etc., may palliate symptoms, but they do not ~~xxxxxx~~ remove the morbid conditions which give rise to the symptoms.

For ^{the} cure of the patient, tissue-renovation and regeneration are needed. ¶ It is not sufficient to cause the disappearance of a symptom. ¶ We may, by means of drugs of various sorts, so ~~practically~~ ^{practically} relieve a patient's symptoms that to-day he may seem to be perfectly well, yet to-morrow he finds himself suffering from the same distresses as before. The patient must be not only relieved of the symptoms and of the special morbid conditions which gave rise to them, but his vital status--his ability to resist disease must be so ^{raised} ~~increased~~ that he will be able to maintain the condition of vital equilibrium which we call Health; he must

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~~be~~ ^{be} in other words, raised above the level of disease. If it is not always possible to accomplish this to such a degree that the patient can resist disease under ~~an~~ unfavorable conditions, or even under the conditions of ordinary life, it may be possible to secure such a degree of improvement that he may enjoy comfortable health— even excellent health under conditions especially adapted to his ^{Special regimen} ~~state~~ ^{habits} condition, and which he may be taught to maintain.

In the treatment of chronic invalids, it is important to recognize the fact that a grave chronic disease involves not a single organ, but many, usually, in fact, the entire body; and its cure necessitates, first of all, that the habits of the patient shall be strictly conformed to such principles and rules as will effectually and curatively modify his disordered vital processes. Health is as much a matter of growth and development as is the sprouting of an acorn, the growing of an oak, or the raising of a crop of wheat. The rational physician keeps ever in mind the fact that the real curative force resides not in his medicine case but in the constitution of the patient. Nature is the real curative agent. The physician really assists his patient toward recovery only when he studies the purpose of nature in her efforts, and supplies conditions which will aid nature in her work.

In undertaking the course of treatment necessary for the reconstructing of the chronic invalid, it is necessary, first of all,

to make a thorough investigation of his case . To accomplish this requires more than a conversation with the patient or a ~~mere~~ ^{curious} physical examination. The resources of chemistry, bacteriology, microscopy, and a variety of appliances and methods of precision, ^{must be} ~~are~~ drawn upon to the utmost limit of their utility for the purpose of ascertaining the exact conditions presented in each individual case, and finding for these conditions a precise, and, if possible, a graphic or a mathematical representation. A thorough examination of this sort cannot be completed within an hour or two, but requires two or three days, and often a longer time, as examinations of various sorts must often be repeated to give definite results .

In the ~~physiological~~ ^{physiological} examination the investigation must include not only the heart and lungs but all the other vital organs. The position of the stomach, liver, kidneys, and other ~~various~~ ^{of each a certainty} viscera must be carefully noted, and the condition, so far as can be learned by physical examination. In cases indicating the necessity for such examination, the interior of the bladder, rectum, larynx and other internal organs must be explored by the means essential for this purpose. In cases in which there are indications of disease of the stomach, the patient ^{should} takes a "test meal," and the results of the digestion of the meal for one hour ^{should be} ~~are~~ carefully examined by precise chemical and bacteriological methods, by means ^{which} ~~of which it~~ is possible to determine with accuracy the exact form of indigestion from which the patient is suffering. ^{only}

By means recently devised, it is possible to obtain exact knowledge respecting the capacity of the stomach. ^{and} By a system of coefficients, mathematic^{al} expressions may be found for both the quality and the quantity of the activity of the stomach in its different lines of work. The following have been worked out with such accuracy as to furnish a reliable standard² for comparison.--

* Coefficient a, relating to the digestion of ~~albumin~~ proteids:

This coefficient is found by a comparison of the total acidity with the acidity represented by the free hydrochloric acid and the combined chlorine quantitatively determined. ^{after a test meal} When the total acidity is greater than the sum of the free hydrochloric acid and the combined chlorine, the indication is positive that acids are present which have been formed by fermentation. When the total acidity is less than the sum of the free hydrochloric acid and the combined chlorine, the indication is that neutral or ammoniacal compounds have been formed; in other words, that the products of proteid digestion are ~~viciated~~ ^{viciated} by abnormal chemical changes, or by the products of bacterial action upon the proteid elements of the food.

Coefficient b, relating to ^{the} stomach digestion of starch: This coefficient is found by a determination of the actual percentage of maltose present in the stomach fluid as the result of the conversion of starch by the saliva, and also, of the amount of unconvert-

ed starch in solution. The relation between these two indicates the activity of the saliva in converting the soluble starch into maltose. The total quantity ~~off~~ soluble starch and maltose is also ^{an} important indication of the degree of activity of the salivary digestion in the stomach.

Coefficient c, relating to the salivary secretion: This coefficient is both quantitative and qualitative, as ^{with} the digestive ^{and the activity of the salivary glands} activities are taken into account. Normally, 10 c.c. of saliva is produced in five minutes by chewing paraffine. One c.c. of normal saliva will convert .100 grams of starch in five minutes. By comparison of this data with that obtained in any given case, the relative value of the work of the salivary glands may be accurately studied.

Coefficients m and n, relating to the quality of the gastric juice: Coefficient m shows the relation of the amount of hydrochloric acid set free to the total chlorine, an important fundamental fact in the chemistry of stomach digestion. Coefficient n shows the relation of the ~~combined chlorine~~ ^{set free to normal} ~~to the total chlorine set free.~~

Coefficient x ^{showing} shows the relative amount of fermentation which ^{is} taking place. This coefficient, as also the coefficient relating to proteid digestion, was first established by Hayem and Winter, of Paris. It is determined by comparing the total acidity with the calculated acidity, the latter being obtained by adding

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together the combined chlorine represented in ~~the~~ hydrochloric acid and the free HCl. I find it useful to supplement this coefficient by a bacteriological examination of the stomach fluid, since there are fermentations in the stomach which do not produce acid. Indeed the most important of the fermentations which occur in the stomach are those which result in the breaking up of proteid substances producing ptomaines and toxins of various sorts. These fermentations may produce alkaline rather than acid substances. I ~~have~~, in several instances, found the stomach fluid to be alkaline in character, instead of acid, ~~of acid.~~

Coefficient z: The coefficient of absorption or motility,

z ~~showing~~ the rate at which the stomach empties itself. ~~--- This is~~ *shown*

~~shown~~ by a careful determination of the contents of the stomach. This is accomplished by introducing a known quantity of ^a weak solution of ^{an} iodine salt ⁱⁿ the stomach; then removing and comparing with the standard solution. The relation between the two furnish es a basis for a proportion whereby the exact amount of residual stomach contents may be determined. This method I have detailed at length ~~elsewhere.~~ *in another paper.*

Coefficient r, showing the relation of the stomach to normal,

as regards ^{its} capacity. The normal stomach, as I have shown by the study of a large number of healthy individuals, is one c.c. of capacity for each millimeter in height. Dividing the capacity of the stomach in cubic centimeters by the height ^{of the individual} in millimeters gives

the coefficient for a given case. The exact capacity of the stomach is determined by first determining the quantity of its fluid contents, and then filling the stomach with fluid to its utmost capacity, carefully measuring the amount of fluid introduced. In another paper, I have described at length the method of ascertaining both the amount of stomach contents and the capacity of the stomach.

In connection with ~~the~~ ^{of the fluids} stomach examination, a careful bacteriological examination must ~~also~~ be made of the ~~fluid~~ ^{contents} in cases in which there is evidence of either organic or functional disorder of the stomach. ^a The portion of stomach fluid obtained after ^a the test meal is submitted to examination by means of plate cultures and tube cultures in various media whereby is determined not only the number of germs per c.c. of stomach fluid but the character of the germs present, and of the poisons produced by them. Germs are found present in great numbers in a much larger proportion of cases than might be expected; even cases of hyperpepsia are

often found to contain great numbers of microbes, ^{nevertheless} ^{learned by several hundred observations, establish that the} Biological tests are also made by means of beef tea cultures ^{heat} made from the stomach fluid, and various chemical tests are applied ^{microbes are not present} for the purpose of determining the activity and character of the ^{gastric} poisons present. ^{in normal stomach digestion}

~~of the blood~~ An examination of the blood must be made for the purpose of determining the number of blood corpuscles and the amount of red

coloring matter as compared with the normal quantity. ^{is} By this examination the physician determines at once whether the patient has an excess or deficiency of blood, and whether the excess or deficiency is in blood corpuscles or in coloring matter. Pale persons often have an ample supply of blood, while in many cases persons with red lips and rosy cheeks are found to be deficient in this important element.

A thorough examination of the urine must be made in every case not only with reference to the presence or absence of sugar, which is present in diabetes, of albumin which is usually present in Bright's disease, and of other unusual substances, but with reference to the amount and character of the ^{various} poisons present in the urine, and the presence or absence of excessive amounts of uric acid, urea, etc.

THE BATTLE CREEK SANITARIUM.

11

In cases requiring it, a special examination ^{must be} is made for the purpose of determining the urotoxic coefficient. This examination requires the injection of a quantity of urine into the veins of a rabbit until the animal dies. Careful note is taken of the symptoms exhibited by the animal, and of the exact amount of urine required to kill it. A careful comparison of the deadly dose of urine with the weight of the animal and the weight of the patient gives a coefficient which indicates whether the amount of poison daily removed from the body of the patient is sufficient to keep the blood and tissues pure, or whether these potent causes of disease are left to accumulate within the body.

The importance of determining ~~urinary~~ ^{urine} toxicity in a large variety of cases is daily becoming more evident. An unusually toxic condition of the urine is generally found in epilepsy, melancholia, in many forms of ~~disease~~, nervous disease, and, in cases of indigestion ~~resulting from~~ ^{connected with} dilayation of the stomach, and resulting stasis in the alimentary canal.

A thoroughgoing examination of the patient will include an investigation of the strength of each of the principle groups of muscles of the body whereby a physical chart may be constructed by means of which it may be seen at a glance whether the patient is weaker or stronger than an average person of the same height and sex and just what muscular groups are especailly weak, requiring special attention for the correction of such deformities as spinal curvature, round shoulders, hollow chest, etc. The dynamometer also renders possible the computation of a series of coefficients whereby the ~~individual~~ ^{physicain} may see at once how ~~he~~ ^{temperature} stands with relation to the average person of the same height, whether he has the proper degree of strength, and the necessary development of lungs for height and for weight, and just the percentage of his ~~of his~~ deviation from the normal standard. An examination of this sort will give accurate knowledge respecting the condition of both the muscular and the nervous system of an individual, and thus becomes a guide to prescription for other treatment as well as ex-

ercise .

The height - weight coefficient also ~~enables one to see~~ ^{determines} at once whether the patient should be made to gain in flesh, or to lose, and how much, and thus offers a valuable suggestion respecting the dietary. By repeated examinations, it is easy for the patient, ^{as well as the physician} to see whether he is gaining or losing in strength, and whether his development is taking the right or wrong direction, and to just what extent. It is not uncommon for persons to increase their total strength a thousand pounds in a month. Patients, while under treatment, frequently more than double their total strength.

Bacteriological and microscopical examination of the sputum and other excretions must be undertaken; also especial examination of the eye and ear. ^{in cases requiring such examinations must be made} Special psychological and neurological researches, in cases requiring the same, ^{and} valuable information ^{may} be obtained from the Roentgen ray, which should be accessible when required.

By the aid of these ~~processes~~ and thoroughgoing methods of examination, the patient's exact condition may be readily determined, and a rational prescription may be made whereby the proper means may be brought to bear upon the patient for the correction of the several departures from the standard of health which may be recognized.

In undertaking to correct morbid conditions and physical deficiencies by regimen and training, nothing short of a most searching investigation of the patient's condition will enable the phys-

ician to give his efforts the proper direction, since no class of therapeutic agents is capable of greater mischief when applied in a blind or empirical way than physiological measures which may be included under the general ~~name~~ head "Training and Regimen." These measures operate curatively, if at all, by their influence upon the physiological processes of the body, hence their use must be based upon a thoroughgoing knowledge of physiological principles, and of the departures from a physiological state in a given case under consideration.

Under the head of "Regimen and Training," in the sense in which the terms are employed in this paper, we would include regulated dietary, sleep, rest, adjustment of clothing, ~~exercise~~ active and passive ^{exercise} including gymnastics, Swedish movements, massage, as well as such ordinary modes of exercise as walking, riding, boating, swimming, horseback-riding, etc.

We would also include thermic applications by the aid of the three most valuable media by which heat can be communicated, viz., ~~by means of~~ water, air, and light. Heat may be both applied and abstracted by means of water and air; it ~~can~~ ^{may} also be applied in the most effective manner by the aid of light, ^{as by sunlight and the electric light.}

It is evident that for the application of such measures a Sanitarium is necessary.

Describe the Sanitarium.

See "Sanitarium Method."

Every well-trained physician who is abreast with the ~~latest~~ ^{latest} lines of ~~medical~~ ^{medical} progress in medical science, will, I feel sure, readily acquiesce in the correctness of the principles which have been outlined in this paper; but we are continually met with the objection that it is impossible to carry out these principles in private practice. The impossibility of complete control of the health and habits of the patient while living at home, surrounded by the varied conditions which have made him ill, is potent. The necessity for the establishment of institutions in which chronic invalids can be received for a few weeks or months, as the case may require, to undergo the necessary treatment and training for the purpose of laying the foundation ~~for~~ for permanent improvement by inducing constitutional renovation and betterment, is becoming more and more apparent to thoughtful physicians everywhere. The recognition of this want is expressed in the ^{correction} practice which many physicians ~~have~~ in sending their patients away for a time to the seashore, to mineral springs and other so-called "health resorts." That many are benefited by such a change, although the methods employed are crude and desultory, is evidenced by the increasing number of persons who annually resort, by the advice of their physicians, to this method of securing health and improvement.

But the present state of medical knowledge and experience demands something better, and the demand is growing, especially in older communities, for the establishment in every large city, or at least in the center of every populous district, of a sanitarium for the treatment of the sick, in which every known facility for the application of regimen and training in connection with other rational therapeutic measures, shall be provided. The time certainly cannot be far distant when every large town will be provided with such an institution. Such an institution, equipped for scientific ~~lines of~~ investigation, ~~and~~ and under-

taking to give chronic invalids every possible opportunity for recovery and the advantage of every therapeutic agent known to modern rational medicine, will necessarily include the following departments:

First, ¹ well-equipped physiological, chemical, and bacteriological laboratories for the investigation of morbid conditions. The time has long since passed when the physician can obtain ~~an~~ adequate data upon which to base his prescription by the simple feeling of the pulse, looking at the tongue, and listening to an account, no matter how accurate, of the patient's subjective symptoms. The modern results of physiological research has brought to light the significant, minute, and subtle changes in the composition of the secretions and excretions, and has ^{placed} placed in our hands the knowledge whereby the ~~XXXXXXXXXXXX~~ space-searching eye of the spectroscope and the subtle scrutiny of the chemist's balance, may be utilized in the interrogation of morbid processes. Only by the use of these ^{at our command} means ~~is it~~ possible to determine with certainty the nature of ^{the} morbid conditions present and the rate of progress, either in the direction of recovery or in ^{the} a further development of disease.

2. A special department ~~will be required~~ for the preparation of foods especially adapted to the needs of invalids of various classes. It is only by the most persevering and ingenious catering that a crippled stomach can be made to do digestive work of quantity and quality adequate ~~to~~ the rebuilding of a deteriorated organism. The diabetic, the arthritic, the obese, the emaciated, the neurasthenic, the anemic--each class of invalids--in fact, each particular ^{invalid} individual, requires a special adaptation of foods and food preparations to his dietetic needs. Not only a special knowledge of the chemistry of foods and medical dietetics is required, but special facilities and appliances for the preparation of foods adapted to invalids in general and to special classes of invalids in particular. The idea that this drug, or that drug, or any combination of drugs is capable of curing morbid conditions of the stomach,

which are almost universally the outgrowth of errors ^{in diet}, in these days of medical reform and progress, finds no support except in the publications of the nostrum venders and in advertisements of patent medicines.

The most varied and carefully arranged appliances for exercise must be provided, so that this, ^a the most powerful means of tissue renovation, may be utilized to the fullest degree. The facilities of this class must include a ^{capacious and} patients' well ventilated gymnasium, to be used for such exercises as can be taken in classes, such as walking drills, light calisthenics, ^{and} breathing exercises, Delsartes, and other "setting up" drills for the correction of bodily postures and the evils resulting therefrom. It must be provided with apparatus, by the aid of which special exercises may be administered and definitely measured tasks accomplished, so that each patient may be able to do an amount of work suited to his physical condition, as shown by his physical chart or recorded by the coefficients worked out in his individual case; teachers trained in the application of Swedish gymnastics, ^{the most perfect of} ~~all gymnastic systems~~, ^{must be at hand} and ready to carry out the directions of the superintendent, who must himself be familiar with the alphabet of exercises and the principles by which they are combined and applied.

The accompanying figures illustrate a few of the thousands of ^{examples} cases for which this system provides, and which have proven of immense service in therapeutics in the hands of eminent physicians ^{in Sweden} during the last half ^{in the hands of the writer} century, and in this country as well, since their more recent introduction here. ^{During the last twenty years}

One of the most interesting and important developments in this system is what is known as the Schott method of exercise in the treatment of cardiac incompetency, which has ~~been~~ been received with such favor in England, and wherever it has become known. Either alone or in combination with stimulating baths I have seen the ~~area~~ area of cardiac

dullness present in a case of cardiac incompetency, the result of enlargement of the left ventricle, reduced half an inch, or more within an hour's time. ^{dilatation} ^{in diameter} A system of carefully graduated exercises may be said to be, in fact, the only method by which permanent improvement ^{can} may be secured in these cases.

This therapeutic measure, as well as all others, must, of course, be employed in connection with proper regulation of diet and regimen in connection with other rational measures of treatment.

(Show diagram of heart, before and after treatment)

Massage, a modern outgrowth from the Swedish system, is of inestimable service in the treatment of chronic ailments of almost every class. When skillfully applied, ^{by} the various methods of procedure which this system includes, massage alone is capable of meeting almost every therapeutic indication. The variety of physical ^{logical} effects which it is capable of producing ^{is} are equalled only by the marvelously varied effects obtainable through the ^{researches} ^{of} hydrotherapy. This most valuable therapeutic means may be drawn upon to meet almost every therapeutic indication, from the dispersion of an exudate, externally or internally, the restoration of movement to a stiffened joint, the development of power in a weak muscle, the recovery of sensibility in a paralyzed nerve, the removal of congestion, or the restoration of a proper blood supply to an obstructed ~~xxxxxxx~~ vascular area, to the replacement of prolapsed viscus or the emptying of a dilated stomach. ⁹¹ Such active exercises as horse-back riding, bicycle riding, boating, swimming, and the lighter games must also be provided for and the patient must ~~be~~ not be considered well until he ^{has been} ~~xxxxxxx~~ promoted step by step from the lowest condition in which he may be, even though he may ^{have been} ~~be~~ bedridden, to ~~the~~ a condition in which he is able to engage in such active exercises as have been last

named, without injury and with actual profit. The man or woman who must be ^{perpetually} coddled--who must go through ^{be carefully protected} life ~~as carefully~~ as though treading upon eggs--is not well. Such a person is an invalid--at least a valetudinarian. ¶ The accompanying physical chart shows the gain which can be made by a feeble, wholly undeveloped person, in a short space of time by properly adapted exercises. It is very evident that in such a case ^a the general prescription of exercise might have done harm, as the patient was in many points as weak as a child, although in others comparatively strong; but by the exact adaptation of ~~the~~ exercises to the patient's condition, which is made possible by the precise investigation of ^{the strength of} each group of muscles, a prescription was made, which, in the course of a few months, transformed a pale, listless girl into a strong, vigorous, rosy-cheeked young woman full of life and ambition. ^{the total strength gain being more than 14000} The difference between ^a persons of weak muscles and one whose muscles are strong and sinewy, is not simply in ability to lift or to put forth muscular effort. The difference in the quality of muscle is simply an index to the difference in quality of nerve, stomach, liver, and every other vital organ. ¶ The man of iron muscle has the digestion of an ostrich and an appetite which requires no goading. The man of soft, feeble muscles has equally weak nerves, feeble digestion, inactive liver and slow nutrition. Subject a man of weak muscles to such processes as will make him an athlete, and his digestive disturbance, his nervousness, his hypochondria, his uric acid diathesis--whatever other disturbance of nutrition he may be suffering from, will disappear under the ~~magic~~ potent ~~and~~ magic of ~~me~~ active vital processes, a richer blood current, and more highly vitalized protoplasmic life.

The completely equipped sanitarium will necessarily include all the various appliances for the utilization of the varied resources of hydrotherapy, together with attendants trained in the numerous methods of applying water therapeutically. Full and partial baths of various

sorts, showers, sprays, douches of varied construction, the Turkish, Russian, vapor and other appliances for the thermic application of all temperatures of therapeutic ability, to all parts of the body, are the leading features of a complete hydrotherapeutic outfit. It must be remembered that the old empiric methods of Priessnitz, and other hydropathists, or water-cure doctors, will not answer the needs of modern hydrotherapy. Water is an agent of great potency, ^{and} only its application must be made with ~~xxxgxxx~~ the same degree of painstaking effort with which morphia, strychnia, or any other powerful drug is given.

Douches and sprays must be administered not only with carefully regulated temperature, but also with reference to the pressure with which they are applied. The employment of the Turkish, Russian, or ^{other} hot baths in the routine manner in which they are administered in ~~these~~ ordinary bath establishments, where one may buy a bath of any sort to please his fancy, as he would purchase a pound of sugar or a sack of flour at the grocery, will bring grief to the physician who undertakes to manage invalids ^{by} under such a desultory plan. ~~These modes of~~ thermic application, as well as hydriatic measures, must be employed with careful reference to the patient's morbid conditions, and with exact adaptation to his physical wants.

Recent researches seem to show that the electric light is destined to provide us ~~with~~ with a method to displace the older and cruder methods of applying heat. Every ray of light carries with it heat in the form of radiant energy. Radiant heat possesses the immense advantage over heat communicated to the body by means of heated air or water, that it readily penetrates the skin, which, like glass, is transparent to radiant heat, while nonconductile to heat in other forms, and thus is able to readily penetrate the deeper tissues. Experiments which I have made with the incandescent electric light as a ~~means~~ means of applying heat, and as a therapeutic agent in the treatment of chronic invalids, within the last

six years, have convinced me of the pre-eminent value of this means as a mode of thermic application. It is best utilized by means of specially constructed cabinets, several forms of which I have had constructed, photographs of two of which I present herewith.

The researches of Fleury, Winternitz, Brandt, Ziemssen, and a host of others in relation to the physiological effects of water and thermic applications in general, have shown this agent to be all but a panacea for human maladies of every form. Water certainly comes the nearest of being a universal remedy of any agent which has thus far been discovered. It must be remembered, however, that water possesses this wide scope of application only by reason of the almost infinite variety of modes by which ~~TEMPERATURE~~ it may be ^{used} applied through variation of temperature and form of application.

No institution for the treatment of chronic invalids could be considered complete which did not afford ample facilities for the employment of electricity in its various forms, -- ^{the} static, galvanic, faradic and sinusoidal currents all find their places and when appropriately applied, are capable of producing therapeutic effects which cannot ^{so} easily be obtained by any other means. The galvanic current, for example, furnishes a means for bringing into action of degenerated muscles when all other means are without effect. The sinusoidal current, which the writer had the honor to first ^{bring} call to the attention of the profession a number of years ago, and which several years later was independently discovered and appropriately named by D'Arsonval, of Paris, when properly applied is capable of producing passive exercise in a most efficient and unequalled manner. Electricity has been so much abused it has come to be regarded by many as either a fad or a sort of mental therapeutics; ^{but} there is, however, abundant evidence of its real therapeutic value, although its real worth will be best recognized when it is used in connection with hydrotherapy, ~~massge~~, and other ^{rational} therapeutic measures.

That the combined employment of these various measures of training and treatment described, under the favorable conditions secured by a well regulated medical institution, is capable of accomplishing a cure in a large proportion of chronic cases which are commonly considered incurable, has been abundantly proved not only in the author's experience during the last twenty-five years that he has been Superintendent of an institution of this sort, but by numerous others who have been working along similar lines under similarly favorable circumstances.

That the utility of this method of dealing with chronic cases, which may perhaps be termed the "sanitarium method," is steadily growing in the appreciation of the medical profession, is clearly shown by the increasing number of institutions bearing the name at least, if not the real character of general sanitariums. The institution with which the writer is connected, which was the first in the United States to embark upon this broad, and then novel plan of therapeutics, some twenty years ago, is now represented by six institutions under the same management in different parts of the United States, and by six branch establishments in other countries--namely, Australia, Switzerland, Cape of Good Hope, Hawaiian Islands, Samoa, and, as I am glad to note, also by an institution recently established in Guadalajara, in the Republic of Mexico. In all these institutions the same comprehensive plan in the management and treatment of invalids is pursued, and with results which it is safe to say could not be obtained by measures less thoroughgoing and comprehensive. For a number of years back, fully 10,000 patients have received treatment in these several institutions, annually. Of these, a large proportion have been considered hopeless or incurable. Most that have been received for treatment have been sent by their physicians after all other known therapeutic means had been utilized in vain.

A few briefly stated cases will serve to illustrate the efficiency

QUESTION BOX LECTURE IN THE SANITARIUM PARLOR, NOVEMBER 4, 1928

By

JOHN HARVEY KELLOGG, M. D.

We will talk a little to-night about another subject that lies very close to everybody's heart--the liver. I will give you an idea where the liver is. I am going to draw a picture of a serpent upon the blackboard here. It was Victor Hugo, I think, who said, "The serpent is within. It is the cause of war and human commotions and of all miseries. It is the colon. The colon is king." Here is the colon, here is the stomach, and here is the small intestine. The stomach is the kitchen of the body, the small intestine the dining room, and the colon is the garbage box. Here is the gallbladder and here is the liver. Just above all of these organs is a muscle, one of the large muscles of the body and one of the most important, the diaphragm, and above this is the chest wall. Here is the chin, mouth and so on. We won't try to draw the rest of the features.

The stomach takes in the food. The food is digested and absorbed by the small intestine. The stomach only prepares the food for digestion, but the intestine does the real work and absorbs it. This work is done within eight hours after the food is eaten--within less time as a matter of fact. Within about six hours from the time the food is eaten until it reaches this part of the intestine is the time occupied in digestion, and the residue within eight hours after the food is eaten, the unusable residue,

is pushed over here into the garbage box ready to be dismissed from the body. When the food is absorbed in the small intestine all of this foodstuff is carried to the liver before it is distributed to the body because the liver is one of the organs employed in the process of digestion, and we have been talking about digestion heretofore for a few weeks back, and now we want to talk about this very important organ of digestion that is not always considered. The stomach is supposed to be the chief organ of digestion whereas it is one of the most unimportant. The stomach can be removed. I have removed two dozen stomachs myself and have them in bottles, and the patients got along better without stomachs than with them. We have a collection of several dozen stomachs that have been removed.

I met a man on the porch one day. I said, "Mr. Jones, how are you?"

"Fine, Doctor; I have gained 17 pounds with my stomach in a bottle."

He had come here a skeleton. He had a cancer of his stomach and it was so developed that I had to remove almost the entire stomach. When the cancer was gone he began to improve at once, made rapid improvement, later weighing nearly double what he did when he came. For seven and one-half years he had excellent health, but then unfortunately a new cancer appeared which involved all the abdominal organs and the poor man died.

The colon can be removed also. Some years ago we used to remove the colon quite frequently. I remember one case in which I found it necessary to remove the entire colon clear down to here.

That is all that was left of the colon. All the rest was removed. And this operation was done quite frequently. People got along perfectly well without the colon. So you can remove the stomach and you can remove the colon, but the small intestine must be retained. It is possible to remove a part of the small intestine. If more than two-fifths of it is removed the patient cannot survive. But a person can get along perfectly well if he has the colon removed and the stomach removed and a third of the small intestine.

The liver is one of the most important of all the digestive organs. One can get along without the stomach but not without the liver very well. Formerly an animal would not live more than two days and a half when the liver was removed, but now it is possible for an animal to be kept alive a long time after the liver has been removed.

One of the functions of the liver is to store up sugar. All the starch we eat is converted into sugar and absorbed. I wonder if any of you remember how starch is converted into sugar? Which one of the digestive fluids converts starch into sugar?

"Saliva."

That is one.

"Pancreatic juice."

The starch is digested by the saliva, pancreatic juice, and intestinal juice. We have rather short memories, haven't we? You remember we learned that the other day. Starch is digested by the saliva, pancreatic juice and pancreatic juice. Fat is digested by the bile, the pancreatic juice and intestinal juice. The pancreatic

juice digests starch, albumin and fats. Saliva digests one thing, starch. The gastric juice digests one thing, protein. The bile digests one thing, fat. But the pancreatic juice digests all three of those things, starch, albumin and fats, and the intestinal juice digests all these things, starch, albumin and fats and cane sugar in addition.

Now, when the starch has been converted into sugar, that is for the purpose of rendering it soluble so it can be absorbed. Starch in its ordinary form is insoluble, but when it has been converted into sugar it becomes readily soluble. If you strain a sugar solution through a cloth it will all go through, but if it is a starch solution the starch will remain on the cloth and only the water will go through.

Digestion in the stomach and intestine converts starch into sugar and it is absorbed, and when it comes to the liver the liver stores it up. The liver is a sort of fuel box for the body. It is to the body just what the tender is to the locomotive. It carries coal. Sugar is the fuel of the body. It is the burning of sugar that keeps the body warm. Sugar is to the body just what coal is to a furnace or to a steam engine. A person may eat a half pound of starch at a meal. After being converted into sugar we do not want it all thrown into the blood at once, because if it were the fires of the body would be choked, and, as a matter of fact it would be necessary for the kidneys to remove this sugar rapidly or the blood would be destroyed and the whole processes of life would be disturbed. So the sugar is stored up in the liver and held up in

the liver and passed out as it is needed a little at a time, a few grains at a time. The amount is really very small. About sixteen ounces of sugar are required each 24 hours. That would be two-thirds of an ounce for every hour, or one-ninetieth of an ounce per minute, or $\frac{1}{5,400}$ of an ounce each second. That is needed by the body to keep it warm and to keep it supplied with energy. Now, the liver carries on this work of doling the fuel out to the body just as it is needed; in other words it is a sort of automatic stoker for the human furnace.

The liver does a great many other things also. It makes bile. Bile is an interesting substance because it is both an excretion and a secretion. As a secretion it helps to digest the food and as an excretion it carries away alkaline poisons from the body. These poisons are the most poisonous in the body. The alkaline wastes are the most poisonous of all the body wastes. They are so poisonous that bile is six times as poisonous as urine. The urine is loaded with poisons, but the bile is six times as poisonous as the urine is. There is about three pints of urine produced in 24 hours, from two to three pints, depending upon the amount of protein you eat and the amount of salt you eat. If one lives upon a well balanced diet the amount would be about a quart. If a person eats a good deal of protein and a good deal of salt then the amount would be increased to perhaps three pints. The amount of work done by the kidneys depends very largely upon the diet. If one eats a great deal of meat the amount of work is often twice that on an ordinary mixed diet. The amount of work required of the kidneys is about three times as great as when one lives on a biologic diet. The amount of urea and uric acid and of poisonous products of various sorts is three times as great when one lives on an ordinary mixed bill of fare.

eating the ordinary amount of meat. The liver removes this extra amount of protein that is taken in, *luxus ration* as it is sometimes called. The liver removes this in the form of poisons. They are all converted into urea and other toxic substances. They do not take any part in the structure of the body but are removed at once through the kidneys.

Now, the liver has something else to do. When the products of digestion are brought to the liver there is to be found in it portions of protein that have not been completely digested in the alimentary tract and the liver deals with these also. It converts them into urea.

But the liver does something else that is very important. It removes poisons. If one takes tea and coffee, for example, the liver undertakes to take the caffeine out and the other poisons that are in these substances. In the case of alcohol the liver takes out the alcohol, as much of it as it possibly can. If a person smokes, the liver gathers this nicotine out of the blood and stores it and endeavors to destroy it. The work of the liver in destroying poisons is of the greatest importance to the body. All sorts of poisons are destroyed in the liver. When a person gets infected with typhoid fever germs these germs begin to manufacture poisons. The liver at once sets to work to destroy ^{the} poisons and to make antidotes for these poisons. If the liver is successful in making enough of the antidotal substances and is active enough in destroying the poison then the person survives; but if the liver is feeble and not able to do this then the person dies from the typhoid toxins which are produced by the bacterium of this infection. The same thing is true of scarlet fever and of every other infectious disease. The symptoms are due to the poisons produced by the disease and these poisons the liver endeavors to destroy. If a person

has a good liver he is able to go through with these infectious diseases and survive them without any difficulty because the liver destroys the poisonous substances they are making and by and by a sufficient amount of immunizing bodies are produced so that the poisons are antidoted and the germs are prevented from further development and then the disease comes to an end.

So you see this poison destroying property of the liver is one of its most important properties. It is the only thing that stands between us and death under many circumstances. No one would ever survive a single attack of typhoid fever or scarlet fever or any other of these severe infectious maladies if it was not for the ability of the liver to destroy these deadly poisons which these infectious bacteria produce, so it is of the utmost importance to have a healthy liver, a vigorous liver.

We sometimes find people complaining about their livers. A person will say, for instance, "I am bilious." Now, somehow people from the most ancient times have believed that the liver was somehow involved in an attack of biliousness, and the liver has been recognized as being somehow connected with a good many maladies, particularly with certain mental maladies. For example, a person has the blues. The ancients said when a man had the blues he was hypochondriac. We often say when a man has the blues and is very melancholy he is down in the mouth. Why do we say he is down in the mouth? Because the muscles of his mouth are drawn down. These muscles attached to the corners of the mouth pull the corners of the mouth down and so a person is really down in the mouth. On the other hand when a person is happy the corners of the mouth are lifted up; in fact, that is about all the difference between having the

blues and being happy is where the corners of the mouth are. If they are pulled up so, you are happy, and if they are turned down the other way you are melancholy. The ancients believed that this condition was somehow associated with the liver. They said a person who had the blues was down under the ribs—hypocondriac. That is what that means. Hypo is ribs and chondriac is down underneath. There is a reason for believing this. So it is quite natural—the very acute observers some of them were in the olden times—they should have reached the conclusion the liver had something to do with these mental states because, as a matter of fact, the real cause, as we now know, is the fact that the liver has been so overwhelmed with work that it is not able to remove the poisons. The poisons were sent in upon it in such quantities that it was not able to remove all these poisons.

We find in the newspapers advertisements of all sorts of liver stimulants. Many times I have had people say, "Oh, Doctor, if you would only give me something to whip up my liver." Millions of times patients have gone to their doctors and said, "Doctor, I need something for my liver. My liver is out of order." And the usual something that the doctor gives—used to give in olden times, but not so often nowadays—was quantities of calomel or blue mass, mercury in some form, and this was supposed to be of very great service to the person suffering from conditions attributed to the inactive liver, because after taking a dose of medicine the bowel discharges would be bilious. There would be large quantities of bile discharged from the body. I have no doubt these remedies were temporarily beneficial, although in the end harmful, because mercury is a poison which the liver has to remove from the blood, and a portion of it being absorbed the liver has it to deal with, ^{and the mercury}

is gradually deposited in the liver. In cases of people who had been accustomed to taking these doses of mercury there were large quantities of mercury found in the liver. The liver captures the mercury and stores it up to keep it from getting into the rest of the body because it is a poisonous substance.

Now, these persons experienced relief under those circumstances because the bile was removed, old stale bile. Persons suffering from this form of biliousness, so-called, are persons whose bowels have been inactive. The garbage box has not been emptied often enough and the food residues remaining for a long time undergoing putrefaction have saturated the body with poisons. The blood has absorbed these poisons, and when the blood is brought around to the liver for filtration the poisons have simply overwhelmed the liver so that it is impossible to do all the work required of it. In such cases there is invariably an inactive state of the bowels. When these residues are retained in the colon the colon does not act as frequently as it ought to; that is, after every meal. The result is that the bile, as well as the food residues, is retained.

The bile is a poisonous substance, as I was telling you a few moments ago, six times as poisonous as the urine, and when the bile is retained in this way it is re-absorbed. It is re-absorbed just as it would be if it were taken as a dose of medicine. Being retained for so long a time it is re-absorbed into the blood and the liver has to excrete it again. So it is absorbed and excreted and absorbed and excreted again and again until it becomes concentrated to such a degree that it acts as a veritable poison in the blood and the whole body suffers in consequence.

This poisoning that is going on continually when a person's bowels are inactive by and by may reach such a degree that his brain is so intoxicated he cannot think properly and perhaps he has an attack of headache or an attack of blues. He is not able to concentrate his mind, is not able to sleep well at night, loses his appetite, gets a coated tongue and becomes generally miserable. That is the condition people describe as biliousness and the liver is really involved in it, not because it is lazy, because it is doing all the work that should be required of it, but because it has more work put upon it than it is possible for it to do. So the way to find relief is not by stimulating the liver, compelling it to do more work, which is like applying a whip to a horse that is already overloaded. The thing to do when your horse is overloaded is for the man riding on top of the load to go behind and push. That is what a person needs to do who has a so-called lazy liver, not to increase the work of the liver or to try to force the liver to do more work, but to cease making work for the liver and to get rid of this rubbish in the colon.

The dose of mercury unloads the colon because it is a cathartic, but at the same time it increases the work of the liver by the absorption of the poison and crippling the liver by being stored up in it. Experiments made by Dr. Bennet, of Edinburgh, more than 130 years ago, showed that after the use of mercury the liver actually does less work than it did before. The liver actually makes less bile than it did before.

The way in which mercury benefits is not by making the liver produce more bile, but by causing the bowels to carry the bile off before it has time for absorption. It is getting rid of the stale

bile that is of benefit. The same relief may be obtained by the simple administration of biliary drainage, a tube passed down and passed into the duodenum and the bile allowed to drain out. It is a very slender tube. One end of it is swallowed. The patient lies on the right side. A little ball leads it down until it comes into the duodenum, and when it gets to where the bile is discharged into the duodenum the bile begins to drain out. I am acquainted with a doctor who told me he drained out as much as three gallons of bile in one case. A pint or two of bile is frequently removed in cases of this sort.

Relief from headache and bilious feelings is often immediate. It gives very great relief. This is a better way to get rid of surplus bile than to accomplish it by giving doses of cathartics of various sorts which act upon the whole alimentary tract.

This so-called biliary drainage does not reform a diseased gallbladder. It will not cure a diseased gallbladder. It will simply get rid of poisonous bile. It is useful for that purpose and might be used perhaps more frequently than it is used with advantage.

There are a good many other things that the liver does, but we will not try to tell you all about it to-night.

It is important to have an industrious liver and to have it always in good working order, and this can only be accomplished by not giving the liver extra or unnecessary work to do. The most common way in which the liver is burdened is by the use of poisons such as tobacco, tea and coffee and by overeating, but particularly excessive quantities of protein. These are ways in which the liver is greatly overworked.

There are ways in which the liver can be encouraged to do

its work more effectively. One of the ways is by taking in greater quantities of oxygen, especially breathing cold air. Cold air is dense with oxygen. The oxygen is concentrated in the cold air because air expands $\frac{1}{490}$ with every degree of temperature. If we make a few figures here you can see what that means. When you breathe air at say 30° above zero, just a little below freezing, and then breathe air at 100° , this air at 100° is 70° warmer than air at 30° . So a person in breathing this air would get one-seventh less oxygen than he would if he breathed air at this temperature. Breathing air indoors at 70° and then going out-of-doors and breathing air at say 40 or 50° lower you would perhaps get 7 per cent more oxygen in the cold air than you would get indoors. Seven per cent means quite a difference, quite an improvement. If one is getting 7 per cent more oxygen into his lungs that means 7 per cent more activity of his liver for oxygen is necessary for the liver to use in its work of destroying poisons. It cannot get along without oxygen. The more oxygen you get down here to the liver the better it is able to do its work. So that is one of the advantages of the cold air.

That is why people are less subject to biliousness in the fall and in the winter when we have fresh cool air than they are in the spring when the air is warm. Spring biliousness is a common expression. A great many people used to seek relief from spring biliousness by bitters of various sorts and spring tonics of various kinds. These remedies were used to get rid of this spring biliousness which is partly the result of the approach of warm weather and less oxygen.

Another means by which the liver may be stimulated is by applications of cold to the surface. Put your hand in hot water and you will observe it will have a dusky red color in a short time. Now put it into cold water and it becomes blue in color. After you take it out of the cold water you wait a moment and watch it and you will see it becomes a bright red color. That is the difference between heat and cold. Heat paralyzes the bloodvessels but cold excites the bloodvessels and makes them pump the blood through the bloodvessels more readily. That thing happens in the liver. If you apply hot water over the liver that relaxes the bloodvessels over the liver. If you apply cold afterwards that contracts the vessels of the liver and there will be an increased activity of the liver, so that one of the ways in which we can increase the movement of blood is by these hot and cold applications to the surface. If this application of cold is made to the whole surface of the body that enormously increases the activity not only of the liver but of all these great abdominal viscera. That is why the cold bath is such a wonderful booster. Everybody ought to have some kind of cold application every morning. It sets the whole machine in motion.

I sleep out of doors in order to get the benefit of the cold breathing and when I get up in the morning I jump into the bath tub and pour on the coldest water I can get. I rejoice when I get water down to 40°. It is never higher than 50 and I usually let the water run a little so I can get it as cold as possible, which is usually 42 or 43° degrees in good cold weather. Two or three dashes of water

is all that is required, a dash in front, a dash behind and repeat it three or four times and you step out of your bath and you have an instant reaction which brings a vigorous glow that you feel all through the body. That glow is due to the relaxation of the bloodvessels and the stimulating effect of the cold reaction upon the vasomotor nerves. These vasomotor nerves are the nerves that control nutrition. When you get your skin into this active state by stimulating it through the application of cold, every organ in the body has experienced a stimulation of its function. Its function has been improved. Every organ in the body is stimulated to greater activity. The liver is making bile better and destroying poisons better. The stomach is doing its digestive work better. There is an elevation of tone throughout the body. When a person is low down his vital stamina is low. The great problem is to get him up on a higher level. A person does not get sick until his vital resources are reduced.

If you are riding through on a railroad and you see all along the road that the depots as you passed them one by one were unpainted and if you saw signs of decay all along the railroad you would conclude that the railroad was in financial difficulty; that its resources had been somehow depreciated to such a degree that it was not able to maintain proper upkeep and that it was not able to maintain the road in a fit condition. No road would be likely to allow its depots and its roadbed and its other appliances to get into this dilapidated state so long as it had any resources left.

It is precisely so with the body. The body will keep every function and every tissue up to the normal level as long as it possibly can. It draws upon every resource before it will allow anything to

get out of order. Before any organ gets out of order the body has done its best and failed because it has lacked the power to maintain the normal state. So when we find a person in a state of chronic disease that means his vital resources have been reduced. That means his stamina is at a low level. The great thing to be done for chronic invalids in every case, the fundamental thing to be done is to lift that man on a higher vital level.

There is no agent that I know of that has so much lifting power in it as cold air. Heat gives relief. Heat is comforting because it lessens nerve sensibility. Cold increases nerve sensibility. That is why rheumatics suffer so much in cold. If you have a toothache you would not apply a piece of ice to your cheek. Cold excites and increases nerve sensibility whereas heat has the opposite effect. Heat is comforting and patients are very likely to want to have too much heat. Fomentations are useful and hot baths are very useful and necessary, but these are only a preparation for cold. Cold is the real healing agent. It is cold that increases resistance. It is cold that produces vital reactions that increase a person's stamina and increase his resources for fighting disease.

So we have one great advantage in the winter season. Everybody who is able to endure cold weather is far better off to have the contact with the cold. The people who are benefited by going to warm climates are people whose vital resources are so low that they have lost the power to react. They have lost the power to benefit by contact with the cold. But people who can endure the cold are far better off to have the contact with the cold because it lifts the whole body on a higher level.

When the cold weather begins to come on in the fall, plants get ready for the cold weather, the bark begins to thicken up, and the animals get ready for the cold weather. The hair thickens up and they get ready for the cold weather. They put on what the physiologists call a winter constitution. Now, human beings that live in cold climates undergo that same change. When we undergo the gradual change from summer to winter and we allow ourselves to come in contact with the cold weather as the temperature gradually falls we acquire a winter constitution which is a hardier constitution. It has a greater power to resist disease than the summer constitution and we are greatly benefited by it. That is the reason why the hardiest people in the world, the most intellectual people, the most progressive people are people who live in the temperate zone and have the benefit of the contact with the cold air. This is wholly a matter of gradual training.

Some time ago out West a man met an Indian. It was a stormy day. The sleet and the snow were being blown about by the wind and the white man was all burdled up. He had on a fur overcoat and his ears were muffled up. He had fur gloves on his hands and thick boots and still was complaining of the cold. He met an Indian who had nothing at all on but a loin cloth and seemed to be perfectly happy. He said to this Indian, "Why, aren't you cold?" What do you think the Indian said? "Is your face cold?"

"No, my face is not cold."

"Well," he said, "the Indian is all face. Why should he be cold? The Indian is all face."

He was not cold because his skin had been hardened and toughened . We say hardened and toughened. It does not feel harder, it does not feel tougher, but it feels finer. It has more blood-vessels in it and it has more blood circulating through it. It has more life. When you feel the skin and it is hard and tough and leathery it is because it has a great deal of dead tissue in it, but a well hardened skin that is highly vitalized and able to resist disease is hardier because it has more blood in it and when you feel of it its structure is delicate. A skin hardened by the cold and by contact with the light and the air is not hard and tough and leathery but it is delicate and soft and fine as the most delicate silk because it has more life. It has not so much inactive dead tissue in it.

I remember when I was spending a few weeks among the Bedouins in the Sahara Desert a few years ago I noticed one day a little Arab girl that was running about. It was a rather cold morning. In the mornings in the desert the temperature is often down to 40° and even below sometimes. Sometimes it was eight or nine o'clock in the morning before the temperature would rise much above 40° and I noticed a little Arab girl about ten years old along the path that I was riding along. I was passing along this way quite frequently and saw her every day and I used to toss her a copper as I came along so I seemed acquainted with her. She was as bright as a dollar. One day--it was a particularly cold morning--the little girl was bare-footed and bare armed and wore just one little calico garment which was so thin that you could see the color of her skin through it. I was bundled up with a heavy overcoat and gloves on my hands and I really felt a little cold. My feet were rather cold. I said

to the little girl. "Why, you must be very cold." She immediately thrust up her arm. I spoke through an interpreter, of course, my dragoman. I said, "You must be very cold." She immediately put up her arm for me to feel of it. Her hand was just as warm as toast. I said, "Your feet must be cold." So she put up her little foot and it was just as warm as toast. There she was running about on a cold, frosty morning with nothing but a little thin calico garment. I said, "Don't you sometimes find it cold so you must wear more clothes?"

"No," she said. "this is all the clothes I have ever had."

Now, this child's vitality was so great, her skin was so trained that she was perfectly warm although she had so very little protection.

Now, one of the greatest things that can be accomplished for a person that is on a low vital level is to increase his power to react to cold and that is why we preach the cold bath. I remember a great many years ago I was in Vienna and I called on the famous Professor Winternitz who is a great expert in hydrotherapy, the successor to Priesnitz, the high priest of hydrotherapy. I said to the Professor, "What is new in hydrotherapy?"

He said, "There is nothing new except colder water, colder water, always colder water. I follow Priesnitz."

Well, that was a good lesson for me because I had been trying to yield somewhat to the demands of patients for more hot water. Ask your doctor to give you more cold water. Do not be afraid of cold water. You do not want to be chilled. If you get

too much cold water you will be likely to have a headache. If you have a headache after you have had a cold bath perhaps you have had it a little too long. Short, cold applications will give the body a lift.

At this time of the year we have the advantage of the cold air. The cold air bath is one of the most efficient means of increasing the vasomotor activity of the skin. One of the most efficient of all known means is contact with cold air. So we are at this time of the year giving more and more attention to the cold air treatment and in constructing our new building have arranged upon the top a place especially designed for carrying out this cold air treatment which we call the frigidarium.

The old Romans knew about the benefit of the cold air. It originated in old Roman times. They used to have cold rooms where patients used to go to get the benefit of the cold air. So we have arranged upon the roof this frigidarium.

QUESTION: What are the symptoms of an inactive spleen?

ANSWER: The principal symptom I know of of an inactive spleen, a diseased spleen is rather it is too active. The spleen does not suffer from inactivity. I have never heard of anybody that suffered from inactivity of the spleen, and I think the reason for this is that we can get along very well without the spleen. The spleen is one organ we can spare. The experiment was first made to remove the spleen from cats and found when the cat had the spleen removed it got fat and lazy and cross. That was about the only thing that seemed to happen to the cat. It went on and enjoyed as

healthy a life as ever. I would say the spleen can be removed and has been removed a great many times and under certain conditions with apparently great benefit.

QUESTION: What is the barium x-ray test?

ANSWER: The barium x-ray test is of great use in locating troubles of the alimentary canal. The patient swallows a barium meal. That barium meal will consist perhaps of a glass of Malted Nuts or buttermilk or oatmeal gruel with barium or bismuth in it. When barium or bismuth is mixed with the meal, when it comes down into the stomach, in fact before it gets there, when it is being swallowed each swallow can be seen as it passes down into the stomach. These substances are opaque to the x-ray, and when the light of the x-ray comes through from the under side and the expert looks in from above it makes a shadow. Where the bismuth is the light cannot come through, so he sees a shadow on a fluorescent screen and can follow it all the way down and see how long it takes the stomach to fill and how the stomach acts upon the food, how it empties, where it goes at the proper rate or not, whether there is obstruction here or anywhere along the small intestine and whether the ileocecal valve is intact or not. In a great many cases we find that the ileocecal valve is destroyed, incompetent. It is like this. The cecum is dilated and the ileocecal valve is destroyed. Very often the pelvic colon is fallen in this way and adherent so it cannot rise. Sometimes the cecum is adherent. When the cecum gets full normally it rises and pushes its contents over. It gives them a boost and rises in this way and the contents are pushed over here.

So the alimentary canal can be studied and not only the alimentary canal but the gallbladder, and certain kinds of gallstones can be discovered by the X-ray. If gallstones contain a sufficient amount of lime they will cast a shadow and they can be discovered. The stomach is pressed upon and moved in various directions to see if it is adherent. The colon and gallbladder are pushed about to see whether they are adherent or not. An expert can discover a great many most interesting things and important things in relation to the digestive tract by means of the x-ray. These findings, however, must be compared with the clinical findings, that is, with the symptoms that the patient experiences.

QUESTION: Is there a cure for hay fever?

ANSWER: Yes, hay fever is easily cured. It is only necessary to find the pollen that produces the hay fever and to make an extract of that pollen and to inject it under the skin of the patient so as to render him immune to the disease. Sometimes a person is sensitized to several different kinds of pollen and these different kinds of pollen must all be located. Fortunately this can now be done.

QUESTION: What causes low blood pressure?

ANSWER: A weak heart is a very common cause. Anemia is another cause.

QUESTION: What can be done to raise it to normal?

ANSWER: Exercise is one of the best things. Improvement of the blood is also of value. Strengthening the heart by graduated exercise is a method of very great importance.

QUESTION: Is this condition alarming?

ANSWER: Yes, it is more alarming to have the blood pressure

(Note)

THE SINUSOIDAL ELECTRIC BATH

INSTRUCTIONS ABOUT GIVING

The purpose of this bath is to increase metabolism.

The bath acts in two ways, first, by raising muscular tension and producing muscular work. It is this that gives rise to the trembling sensation which the patient experiences, and which closely resembles shivering, and produces the same effect upon heat production that shivering does.

This is shown by the fact that when the temperature of the bath is low enough to produce shivering, the shivering may be entirely stopped by making the current of proper strength. By making the temperature of the bath 88° or lower, the chemical regulation will occur, thus bringing in a second factor, raising the metabolism rate.

The lower the temperature, the more pronounced the effects. The rate should be gradually lowered from day to day, from the initial temperature of 88° to 80° , or less, if the patient's tolerance is good.

Duration of the bath should be 5-8 minutes.

On account of the effect of the sinusoidal current on the muscles, the patient should easily tolerate as low a temperature in this bath as in swimming. The temperature of the swimming pool is never over 80° . The temperature of the water at the sea shore is often much lower than this. The regulation temperature of the swimming pool is 78° .

The temperature of the bath may be made lower than 80° in sturdy patients who need to reduce in weight.

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PRACTICAL RESULTS IN THE INSTITUTIONAL TREATMENT
hundred
OF TWENTY-FIVE THOUSAND CASES OF
HIGH BLOOD PRESSURE

The rapid increase in recent times of diseases of the circulatory system which have become the largest contributors to the mortality lists, and the acknowledged inadequacy of drug medication in dealing with this class of cases, are the raison d'être of this paper.

The observations and experiments of Pässler, Rornberg, Crile, and numerous other investigators, have so clearly demonstrated the inadequacy of drugs as a means of definitely correcting morbid conditions of the cardiovascular mechanism, the superiority of physical or physiologic measures in dealing with this class of ailments is no longer disputed. There are many pressure-lowering drugs by means of which hypertension may be made to disappear almost at once; but the condition of the patient will generally be found worse instead of better. A rational and scientific method must seek to improve the patient's condition by determining and removing the cause or causes of his suffering.

Although the careful study under favorable conditions for observation of more than 25,000 cases of high blood pressure, has naturally led to the accumulation of a considerable amount of interesting data relating to the etiology and pathology of high blood pressure, this material will be left for consideration in other papers. This paper will be devoted exclusively to a report of the clinical results of institutional treatment in this large group of patients, and a brief description of the methods employed.

By institutional treatment is meant the care of the patient under such conditions as make possible the complete control of the patient's regimen and environment. In no class of cases is this more important than in cases

of chronic vascular hypertension. It is generally conceded that these conditions are very generally the result of faulty habits and an unwholesome environment. The complete change of habits and environment which removal from domestic, business and social responsibilities for a season is often an essential first step toward recovery. This may be sometimes accomplished by a vacation,-a journey, a voyage or simply a rest. But the relief thus obtained is rarely other than temporary. A return to old habits and environment results in a speedy relapse, so that only very temporary relief is obtained.

Adequate institutional treatment gives the patient all the benefits of a vacation, with the added advantage of skilled medical direction and supervision, by means of which all the benefits of a vacation are greatly augmented.

A CRITICAL DIAGNOSTIC STUDY OF THE CASE

Scientific therapy must be based upon a critical study of each individual case by the aid of up-to-date diagnostic methods and appliances. First of all, the blood pressure must be taken in such a manner as to avoid misleading findings. A careful study must be made of the urine, in the high acidity of which may be found the ^{evidence} cause of a diminished blood alkalinity, with lowered vital resistance and the presence in the blood of disturbing elements.

Electrocariographic and metabolism studies are highly important and often point the way to prompt relief by physiologic measures. X-ray studies of the heart and blood vessels, ophthalmologic examination of the retinal vessels, and are other diagnostic means which often throw great light upon obscure cases.

Of great importance, also, is the opportunity afforded by having the patient in residence for a careful study of his case under different conditions and to note his reaction to environmental contacts and therapeutic

applications.

A thorough-going physical examination includes, also, tests of strength, and endurance, posture, nerve and mental tests and _____

The abundant and convenient diagnostic facilities of a well-equipped institution render possible not only a critical investigation of each individual case, but the frequent repetition of examinations and tests for the purpose of checking the results of treatment and noting the patient's progress.

The following is the general program of treatment followed in the treatment of hypertension cases at the Battle Creek Sanitarium, with variations to meet the needs of individual cases.

Habits. ⁹ The harmful effects of alcohol, tobacco, tea, coffee and cocoa are now so well recognized, most hypertension patients recognize the need of a reform in their habits and are quite ready to co-operate, and, fortunately, discomfort experienced by a discontinuance of these habit-forming drugs, is of brief duration, the effect of the regimen and treatment being to destroy the desire to smoke and the craving for tea and coffee to such a degree removed that often, in the case of tobacco, the odor of the weed becomes offensive. Since Huchard showed that a leading cause of hypertention and arteriosclerosis is the circulation of toxic substances in the blood, the production and maintenance of the highest possible degree of blood purity is made one of the chief objectives in the management of hypertension cases.

Diet. Speaking of the structural changes in arteries which are a common cause of hypertension, Huchard said, "The origin of the disease is alimentary, the lesion vascular, but the danger is renal. . . . and the final catastrophe is in a large proportion of cases due to renal failure." And the cause of renal failure is, in most cases, an overload due to dietetic indiscretion, especially in an excessive intake of protein in the form of

meat or eggs. Newburgh has produced arteriosclerosis in rabbits by feeding meat powder in moderate amounts.

Folin has shown that all excess of protein above requirements for tissue repair is eliminated very promptly by the kidneys in the form of urea. Any surplus of protein is thus a burden to the kidneys and may lessen their efficiency to such a degree that the blood stream becomes loaded with toxins. A rapid fall in blood pressure often occurs in hypertension cases when the protein intake is restricted to actual requirements, which physiologists now agree is not more than two-thirds of a gram per kilogram of body weight.

Bunge many years ago pointed out the importance of balancing the diet for acids and bases by restricting the intake of proteins containing an excess of phosphoric and other unoxidizable acids; and Sansum and his followers have shown that such a restriction, by increasing the alkali reserve of the blood, tends to lower blood pressure and leads to repair of renal damage. The marked tendency in these cases of hypertension, as shown by the high acidity of the urine, may, fortunately, be successfully controlled by means of a carefully selected alkali-ash dietary.

It thus becomes apparent that the quality, as well as the quantity of the protein intake is a matter of importance in feeding cases of hypertension. This fact is further emphasized by the discovery made by Tissier, of the Pasteur Institute, who proved that proteins of animal origin, especially meat and egg proteins, undergo putrefaction much more readily than do those of vegetable origin. Dale showed that para-hydroxyphenylethylamin, a toxin present in decaying meat, has properties similar to those of adrenalin, and when injected into an animal produced an immediate and very great rise in blood pressure.

It is evident that suppression of intestinal putrefactions is of the highest importance in these cases and for this purpose it is not only necessary to avoid the eating of foods in a state of putrefaction and foods which readily undergo putrefactive changes, but to clear the intestine so far as possible of the proteolytic or putrefactive types of bacteria. Fortunately, this change of the intestinal flora may be easily accomplished by the diatetic measures now easily available and which only require careful attention to a clearly defined technic to insure prompt and uniform success.

In cases of hypertension in which the patient is obese, reduction of weight is necessary and the results are sometimes almost spectacular. Not infrequently the systolic pressure drops a point for each pound loss in weight.

It is thus apparent that careful balancing and rationing of the diet are measures which must receive adequate attention in every case of hypertension. This can be accomplished only by the aid of specially trained and experienced dietitians whose work is constantly checked by examinations of the blood and urine, and in many cases by metabolism studies.

Dr. Arthur Hunter, actuary of the New York Life Insurance Co., has shown that the average blood pressure in China and Japan is appreciably lower than in this country, and attributes the fact to the large consumption of meat in the United States. We quote as follows from Mr. Hunter's most valuable paper:

"While there is little doubt that a reduction in blood pressure of Americans in the United States would result in greater longevity, a question might arise as to the effect on the quality and quantity of their work. Among brain workers and those in sedentary occupation there would be, in my judgment, any satisfactory proof that a low protein diet decreases physical as great efficiency. Among manual laborers there does not appear to be endurance. 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."

As a part of the dietary management of hypertension cases, water-drinking is not to be neglected.

Since the most common and potent cause of vessel changes is now known to be the circulation of toxic substances in the blood stream, it is evident that improved elimination must be an essential factor in the therapeutic scheme. Copious water drinking is one of the most effective means of accomplishing this. When renal permeability to water is good, two to four quarts of water may be taken daily. The patient should be asked to note and report the amount of water taken and the daily output of urine should be measured. If the patient is not taking sweating baths or otherwise perspiring freely, the amount of urine should equal the water intake.

The food supplies sufficient water to balance the insensible perspiration. Most patients take little water and the scanty, highly concentrated urine is a clear indication of the unclean state of the blood and the tissue fluids. The rinsing out of the tissues accomplished by free and systematic water drinking soon shows beneficial effects in the improvement of the skin color, the urinary findings and lowering of the blood pressure.

Of all therapeutic measures there are none by which several essential indications in cases of hypertension can be more certainly or more efficiently met.

Hydrotherapy

One of the special merits of the hydriatic method is its marvelous versatility and adaptability to the most varied and diversified morbid conditions. It must not be supposed, however, that hydrotherapy is a method which will do no harm if it does no good. Hydriatic applications are not likely to be of any benefit unless made in such a thorough and efficient manner that harm may easily result if the application is not wisely adapted to the patient's condition.

In their practical management it is convenient to group cardiovascular disorders into three classes: high pressure, low pressure, and secondary low pressure, remembering that there are "border liners" and intermediate cases of all grades.

In high pressure cases hydrotherapy affords the most convenient and efficient means for lowering pressure by lessening the work^{required} of the heart. It is reasonable to suppose that the blood-pressure is never higher than it needs to be; that is, that the rise of pressure is a defensive process and that the only rational methods of dissipating or mitigating this symptom must be those which are addressed to its causes.

Simple cardiac hypertrophy in itself does not increase the pressure in the vessels. In healthy athletes with very large hearts, when at rest, the tension, according to Gibson, is not abnormally high, and may be even found a little below normal.

A few months ago the writer had an opportunity to examine, at Phoenix,

Arizona, five Indian runners who were there to participate in a Marathon race. 8
Only one of the runners had a systolic blood pressure higher than one hundred; his pressure was one hundred and five. The winner of the race who made near record time, had a blood pressure of ninety five before the race and one hundred a few minutes after the race was finished. This Indian's occupation was that of a sheep herder. His pastures were in the mountains and he had trained himself for the race by mountain climbing.

In arteriosclerosis with hypertension the narrowing and withering of the arterial twigs as the results of the degenerative process threaten the tissues with starvation. The heart must work with sufficient energy to maintain the pressure at such a point that an adequate supply of blood will be forced through the narrowed blood channels to sustain the integrity of the tissues and their functions. The thing to be done then is not to lessen the energy or activity of the heart, but to lessen the resistance against which it works. In other words, the evident indications are: 1. To stop the degenerative process. 2. To dilate the contracted vessels and thus lessen the work required of the heart. 3. To lessen the viscosity of the blood.

While the disuse of tobacco, coffee and other pressure raising drugs and careful regulation of the diet are perhaps the most important means we possess of directly combating the degenerative processes to which hypertension is most often to be attributed, hydrotherapy, through its powerful rejuvenating effects, is capable of rendering great service by improving the oxidation and elimination of tissue wastes and other toxic matters, by regulation of blood distribution, and especially by improving metabolism, the general nutritive processes, and is thus an efficient agent for meeting the first of the three great indications in cases of hypertension.

For meeting the second indication, relaxation of contracted vessels, hydrotherapy is pre-eminently efficient. The skin is the organ through which hydrotherapy produces its therapeutic effects. In cases of advanced degeneration of the bloodvessels, pronounced changes may be noted in the skin.

Brown spots upon the back of the hands and a vanished or wrinkled appearance are superficial evidence of the degenerative changes which are taking place in the vessels and probably in most other internal structures. A skin of the sort described has little vascularity. The result is that this great vascular area which is capable of holding two-thirds of all the blood in the body, becomes nearly bloodless and the heart and internal vessels are overfilled. The splanchnic vessels are greatly distended and degeneration of these vessels is thus encouraged. It is evident, then, that measures which will improve the circulation of the skin must render valuable service in lessening cardiac work and so postponing the evil day when the heart will fail to do its work because of the exhaustion of its reserve power. The improvement in the skin functions which may be secured by prolonged skin training is often very striking. Not infrequently it is at first impossible to induce perspiration in these cases; but after two or three weeks the degenerated sweat glands begin to resume activity and by persevering effort the skin may be in many cases improved to a really wonderful degree. The glossy pallor disappears, and the pigmentation becomes less intense. The skin acquires to a large degree its normal color and suppleness.

In high pressure cases in which extensive vessel changes have not taken place and which are not seriously complicated by renal disease, the pressure usually falls at a most gratifying rate under the influence of the prolonged tepid bath followed by short, cool applications. A fall of twenty millimeters may often be observed as a result of some form of sweating bath. In cases of arteriosclerosis of the splanchnic vessels or generalized degeneration of the peripheral vessels, the improvement which can be secured by hydriatic methods

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Partial cold rubbings, such as a brief cold towel rub, or a mitten friction with water at 65 to 75 degrees, may be utilized to great advantage if care is taken to avoid chilling the patient. It is well to apply a hot bag to the spine or feet during this application, to insure against chilling; but the patient must not be overheated. In patients who are fairly strong the salt glow and the half-sheet rub are most useful means of encouraging the surface circulation.

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The third indication, lessening of the viscosity of the blood, may be accomplished more efficiently and promptly by hydrotherapy than by any other means, and without the undesirable effects from the drugs commonly used for this purpose.

The carefully conducted experiments of Burton-Opitz demonstrated the fact that warm and tepid baths lessen and cold increase the viscosity of the blood to a marked degree. For example:

A bath at 23 degrees C. (73.4 degrees F.) lowered the viscosity coefficient from K 836 to K 760 in fifteen minutes; that is, increased the viscosity of the blood 10 per cent. A bath of 42 degrees to 43.5 degrees C. (107.6 degrees to 110.3 degrees F.) raised the coefficient from K 1027 to K 1126 in fifteen minutes; that is, diminished the viscosity of the blood 10 per cent.

It is interesting also to note that the warm bath lowers blood-pressure by dilating the surface vessels and inhibiting the vasomotor centers while at the same time lessening the viscosity of the blood and thereby diminishing the effort required to force the blood from the arterial reservoir through the arterioles into the venous system of low pressure reservoirs.

Every case of high tension due to degenerative changes either in the systemic vessels or in the vessels of the splanchnic area, sooner or later exhibits lowered pressure, due to exhaustion of the cardiac energy. The enormous increase of cardiac work required to maintain the pressure in the arterial reservoir when the outlets are greatly reduced in number and capacity, sooner or later wears out the strongest heart. If the patient does not die of apoplexy or of some intercurrent malady, death will come in time from cardiac or renal failure. The treatment of this class of cases must be entirely different from that which is appropriate in cases of primary low pressure, for although the pressure falls, the degenerated state of the vessels remains the same.

It is in this particular class of cases that the Nauheim baths are of great service. The systematic use of this bath may greatly prolong the life of a person suffering from secondary low pressure, although, of course, actual cure is out of the question.

By means of an x-ray examination of the chest atheroma of the aorta may be discovered long before degenerative changes can be otherwise discovered. The greatest care should be used in these cases to avoid general cold baths,

general hot baths, and abdominal compression. The patient's life may be easily snuffed out by an injudicious hydriatic application. A severe general chilling of the surface is about as dangerous in such a case as a bullet through the body.

In cases in which the chief changes are in the vessels of the splanchnic area, either with or without accompanying cardiac or renal disease, measures may be employed which will serve to dilate the portal vessels, thus lessening the resistance in the vascular system.

In treating cases of arteriosclerosis, the fact should be borne in mind that the condition of secondary hypotension may have begun, although the blood-pressure is still much above normal. For example, a person who has enjoyed very comfortable health with a blood pressure of 200 millimeters or more, may begin to show symptoms of secondary hypotension with a blood-pressure of 180 millimeters; and the first symptoms of improvement in such a case may be accompanied by increase of tension rather than diminution through improvement of the cardiac energy.

Hydrotherapy is an instrument of great power, but must be used with precision, and every application must be based on an accurate knowledge of the patient's condition, and an appreciation of physiologic principles.

It is clearly evident that only in a well equipped institution under careful scientific direction and by the aid of skillful and experienced attendants, can such powerful procedures as are many hydriatic measures, be safely and beneficially employed.

Exercise In cases of hypertension the patient is greatly in need of exercise, but is at the same time incapacitated for active or vigorous muscular work. The muscles are when active, a great blood reservoir, capable of holding half of all the blood in the body. An inactive muscle is almost bloodless, the volume of blood passing through it being less than one-fifth that when it is in full activity. Curiously, the blood supply of a muscle about to be called into action is increased under nervous control before contraction actually

takes place. This very remarkable fact to which Zuntz and other physiologists call attention, is made use of with great profit in these cases in which active exercise by exciting the heart may raise the blood-pressure and do harm. By means of carefully supervised and very gentle exercises the muscles may be made to withdraw from the central viscera a large volume of blood, thus relieving the strain upon the heart and arteries and lowering the blood pressure. In very advanced cases benefit may be gained by psychic or make-believe exercise in which the patient goes through the exercises in imagination only, fixing his mind intently upon each exercise successively but without any actual movement.

In less advanced cases the exercise may begin with passive movements, which are in due time succeeded by active-passive movements and carefully graduated exercises. In this way, bed-ridden patients are often in a few weeks able to walk miles without injury or great fatigue.

After a time, such light out-door games as croquet and golf may be indulged with profit.

A point of greatest importance is to avoid overtaxing the patient, and to insure this, exercise should always stop short of fatigue and should never be so severe as to cause breathlessness.

The amount and kind of exercise required in each case must receive careful consideration. Great assistance in making the exercise prescription is given by the Universal Dynamometer, an outgrowth of the researches conducted in this department. By means of this instrument it is possible to prepare a graphic which shows at a glance both the relative and actual strength of each of the thirty groups of large voluntary muscles in the body. This instrument, with which more than one hundred thousand graphics have been prepared, and which is in use, not only here but at the Naval Academy training school at Annapolis, where it is made the basis of the system of training, shows at once each weak spot in the muscular system and so safeguards the patient against possible injury.

The great value of voluntary exercise as a therapeutic measure in

Cardio-vascular disease was first demonstrated by Prof. Oertel, an eminent German physician, in his own person. From a helpless invalid at thirty years, suffering from dyspnea, cyanosis and edema, and compelled to abandon his practice, he gradually built up such excellent health that he was able to resume his practice and lived an active professional life for many years. The accompany sphygmographic tracings show the state of his pulse before and after the graduated training to which he subjected himself.

Rest

Rest, even quite prolonged rest is in certain cases quite as important as is exercise in others, in some cases as a means of lowering the blood-pressure and in others to afford the heart an opportunity to recover lost compensation. Repeated electro-cardiographic tracings show the progress of the cardiac muscle in recovering its efficiency.

The "Cure" which consists of resting upon a cot or in a reclining chair out-of-doors, has long been practiced in European countries and more recently in this country as a general method in the treatment of cases of lung tuberculosis. In properly selected cases the "Cure" is a highly valuable measure in hypertension. The most pronounced effects of this breathing of cold air is a great increase in the volume of the tidal air. The automatic expansion of the chest becomes at once so markedly increased that the amount of air inhaled and exhaled at each complete respiration is doubled and even tripled. The good effects of this increased intake of oxygen is shown in better oxidation of tissue wastes, increased cardiac efficiency because of cleaner blood, and an increased oxygen supply to its tissues, an increase in the chemical regulation of heart production and a commensurate rise in the metabolism rate.

This remarkable effect of the breathing of cold air, recently discovered in our research department in connection with a study of the effects of the "Cure" upon metabolism by Dr. Paul Roth, of the Sanitarium staff, supplies a satisfactory explanation of the universally known refreshing effects of cool air, familiar as a fact, but a phenomenon not well understood.

Automatic Exercise

Automatic exercise affords a most useful means of securing for hypertension cases the benefits of muscular activity without risk of overtaxing the heart or creating respiratory embarrassment. In automatic exercise the patient's muscles are made to act by means of electrical stimulation while he rests comfortably in a reclining chair. The form of current employed is the so-called sinusoidal current first employed for this purpose by the writer in the year ----- and described in a paper read before the American Medical Association ----- and a few years later independently discovered, completely studied and named by d'Arsonval of Paris. This current has the great advantage that it is practically painless and so may be applied with sufficient strength to produce muscular contractions of any degree of vigor. The painless character of the current is due to the fact that the changes in the direction of the current as it alternates occur at zero voltage, in contrast with the faradaic current in which the change occurs at the maximum voltage. The accompanying graphics clearly show the contrast between the two currents.

Automatic exercise differs decidedly from passive exercise in the fact that it is real muscular work, although wholly involuntary and requiring no effort by the brain or spinal ganglia. Hence the patient is not fatigued by the exercise, even though the metabolism rate may be increased three or four hundred per cent, or even more .

The blood pressure usually falls several points during an application of automatic exercise, more than after any other procedure with which the writer is familiar, a fall of -----points is often observed as, not infrequently a fall of ----- points is noted.

This measure is especially valuable in cases of hypertension associated with great obesity, or crippling asteo-arthritis, and in cases of hypertension with marked cardiac weakness.

Mechanical exercise in various forms may also render valuable service in hypertension, especially mechanical massage, rubbing, vibrating, etc.

Sun bathing is a measure of inestimable value in the treatment of cases of hypertension. Sun bathing in the open air is most efficient, but light bath administered by means of powerful arc lamps may be made of nearly equal value and are in more convenient because available, by the aid of a suitable equipment, at any place and at any hour, day or night.

The effect of the application is to dilate the surface vessels, thus relieving the heart, while at the same time all the functional activities of the body are quickened and thus the cause of the disease is combated. The most thorough-going effects are produced by the application of the arc light to successive areas of the skin, going over the whole surface of the body in the course of a week. The intensity of the application should be sufficient to produce a moderate degree of erythema. This permanent dilatation of the vessels greatly relieves the work of the heart in cases of hypertension. The application is of equal value in cases of secondary low pressure, although in these cases the beneficial results will be manifested not in lowering the pressure, but in increasing cardiac efficiency by lessening the amount of work required of the heart. Not infrequently the improvement is later shown in a preliminary rise of blood pressure, showing the increase of cardiac energy; but if the treatment is continued, a subsequent fall in blood pressure occurs as a result of the opening of the blood vessels and the oxidation and elimination of the toxins to which the diseased state of the vessels is due. The fall in blood pressure sometimes occurs within a short time after the beginning of the treatment, doubtless due to the lessening of the toxic products in circulation through the vessels, the presence of which gives rise to spasm of the small vessels through irritation of the vasomotor centers.

Care must be taken to avoid overheating of the body because of the depressing effects upon the heart and nervous system. On this account the temperature of the room in which the light bath is given must be carefully regulated.

In the treatment of cases of arteriosclerosis and high blood pressure

it is well to remember that Sansum and others have demonstrated that a marked lowering of the blood pressure may be secured by the adoption of a basic dietary. This excludes meats and eggs and to a large extent cereals from the bill of fare because these foods leave an acid residue in the body and thus reduce the alkali reserve and greatly increase the amount of work required of the kidneys in the elimination of acid residues. The writer has made use of a basic diet in the treatment of cases of this sort for more than forty years and has seen most excellent results in hundreds of cases.

Diathermy

Diathermy properly applied is a useful adjuvant, but chiefly as a means of symptomatic relief. It is chiefly useful in cases in which the chief seat of degenerative changes is the splanchnic vessels and the abdominal viscera.

Psychotherapy

The pernicious effects of worry and other depressing emotions are combated by maintaining an institutional atmosphere well charged with optimism. Doctors, nurses, attendants, waiters, everyone who comes in contact with the patient must be overflowing with hope, good cheer, helpful sympathy and understanding. A full program of health promoting activities keeps the patient busy and his mind occupied with wholesome trains of thought. In appropriate cases the so-called occupational therapy is employed to aid in diverting the patient's mind from his worries.

The institutional method as developed at Battle Creek is not a routine or course to which all patients are indiscriminately subjected, but is a general method of sufficient scope and flexibility to be easily adaptable to all types of cases.

As regards results. It is not to be expected that many cures can be reported, or even that permanent amelioration of symptoms can be claimed in a class of cases in which the leading symptom is in so large a proportion of cases due to irreparable structural damage; but, as will appear from the appended brief excerpts from our clinical records and statistical summaries of the results of treatment in more than twenty-five thousand cases of hypertension,

The general result has been a notable increase in the life expectancy of several persons, aggregating according to the estimate of an experienced life insurance actuary, not less than ⁵⁰⁰~~1500~~ years of human life.

Judging from the results we have seen accomplished by the thorough-going application of a well coordinated system of institutional therapeutic care in these thousands of cases, we feel it ^{within reasonable} greatly ~~with~~ bounds to presume that the more than two hundred thousand persons who die annually in this country from diseases in which hypertension is a dominant symptom, might by an application of the methods above outlined, each be given one to ten years longer life. Fortunately the methods we have described as institutional are for the most part, so readily adoptable to varied conditions and circumstances, that at least the most essential of them may be utilized in private practice and may be applied in the humblest home. Simple, but effective programs of treatment may be prepared by which a hypertension patients condition may be wonderfully benefited if it is faithfully carried out under the direction of his family physician. Our clinical staff of doctors and dietetians is ready at all times and without charge, to offer suggestions for such programs for home care of cases under the supervision of a qualified physician.