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Mineral Nutrition

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Although we are interested in the sale of Ce-kelp as a business we cannot come in contact with people suffering from various ailments without wishing we could do everything possible to aid them. It is not in our province to prescribe medicines for them for the physicians are trained in this field and we trespass if we do so.

But there are certain fundamentals in the knowledge of nutrition which we can use to help people either sick or well, which do not trespass on the field of the physician. The patient is best served when the nutritionist and the physician work together.

Drs. Sherman and McCullom are the leading nutritionists of this country, and much which will be written in these letters were obtained from their writings. Other statements are made because of my own findings, particularly as regards sugar, calcium and phosphorus, and kelp.

Nutritional science like every science overlaps all the others. It involves a study of anatomy, physiology, heredity, environment, chemistry, soils, geology and whatnot. It is a rapidly developing science and every year a great deal is added to our knowledge of the subject.

Much confusion exists about nutrition because of many false prophets, people who have every good intention in the world, but who have a bug on this or that method of eating or living which is sure to cure the ills of the world. Some insist that we should eat only meat; some that we should eat only vegetables, others only milk and fruit, others no milk at all. Some believe that we should chew meat a certain number of times; some that we should not chew it at all; and all cite countless instances in which their particular system worked wonders.

As a matter of fact we can eat anything that agrees with us. Man is neither herbivorous or carnivorous, but is both. He hasn't as long an alimentary tract as the herbivorous animals and has not as short a one as the carnivorous.

He has grinding teeth for vegetable, grain and fruit foods, and tearing teeth for meats. He has digestive juices which are adapted some for meats and some for vegetable foods.

The important thing to remember is that the cells of the body are continually wearing out and being replaced, and many substances are required in a continuous supply if the body cells are not to be made of inferior ingredients.

The Endocrines

The endocrine or ductless glands have charge of this work. They might be said to be the foremen on the job. If they should all stop work the body would die immediately.

They oversee the building operations, different endocrines having different jobs.

The boss endocrine is the pituitary. It oversees all the others. Its job is to maintain co-ordination among the other other endocrines.

In order that co-ordination may be maintained, the endocrines are linked up by what is called the autonomic nervous system. This in turn is divided into two kinds—the sympathetic and the parasympathetic nervous systems. Nerves of both systems supply each endocrine. Each endocrine has another endocrine which opposes its action so if the pituitary sends a message to one gland to speed up, its antagonist slows down and vice versa.

These foremen glands can't do much of anything unless the boss gland (the Pituitary) tells them to do so. Sometimes they have to work hard and other times they can take it easy. For instance, when we are frightened the boss gland tells the adrenal gland to get to work, and in a second or so it produces a secretion which enables our muscles and nerves to act strongly and quickly, in order that we may get out of danger. The opposing gland which tends to neutralize the adrenal secretion by one of its own, subsides in order to allow more of the adrenal secretion to function.

When the emergency is over, both glands regain their normal condition of check and checkmate.

Suppose all of a sudden our food did not contain the various materials which it did formerly. Something would be bound to suffer; and the part of the body which would suffer most would be the part most dependent upon the absent ingredients. If the result is very obvious it is easy to take steps to correct the difficulty. Such has happened countless times in the past. When our diet has been too limited in fruit for instance our appetite begins to crave fruit. Sometimes when the body needs calcium and there is a deficiency in the food of this material, the appetite undergoes unusual change. Children will sometimes eat plaster to supply their craving; pregnant women often crave certain things, and usually they should be supplied, for the craving indicates a need.

I say it usually should be supplied because sometimes this craving expresses itself in a desire for unnatural foods such as candy, etc. The explanation of this is that the body craves natural foods that are sweet but which also contain minerals and vitamins; and is unable to differentiate between natural and unnatural foods having the same or similar flavor.

Sometimes the results of malnutrition are not so obvious. This is especially so when a good share of our people show these less obvious effects. Their very number serves to disguise the condition. "We can't see the woods for the trees."

Moderns versus Primitives

It is only by the study of people of whom the majority are well nourished that we learn to recognize the symptoms of malnutrition. Such study has been carried on by several people the chief of whom is Dr. Weston A. Price of Cleveland. He has spent several years visiting out-of-way peoples, who are living in their natural surroundings—a more or less primitive life.

Among the peoples he has visited and studied are the Eskimos, the South Sea Islanders, people living in remote regions of Switzerland, the Sudanese natives of Africa, the Indians of British Columbia, and recently the Indians of Chili and Peru.

The outstanding difference between primitive people and civilized people was that the primitive people showed hardly any trace of the degenerative diseases so prevalent among civilized peoples. He explains this is a result of their eating natural foods, having no access to white flour, sugar, etc., and mainly eating their foods in the raw state, which conserves its mineral and vitamin content to the fullest.

That this result is applicable to people of our kind was demonstrated by the inhabitants of Tristan da Cunha, an island in the South Atlantic where about one hundred and fifty years ago a ship was wrecked. The men and women on the ship were English. There was no physician among them, and they had to get along the best they could with the natural foods of the island and sea.

Being off the ship lanes they were never visited by other people until they were discovered by accident a few years ago. At that time the people were robust and healthy and had no dental decay. A report was made through the dental journals of the remarkable health of the people.

Once these people were discovered they lost their isolation. People came to observe and wonder, bringing with them the foods of civilization. Mail service was set up by the British government and the products of the island were exchanged for the products of civilization. A second survey was made five years after the first one. Alas! things had changed. No longer was it a little garden of Eden. People were having troubles the same as you and I.

Only 50.3% of the mouths were free from extractions and decay in 1937 as compared to 83.33% in 1932. Gingivitis had increased from 3.21% in 1932 to 26.20% in 1937. The habits and diet of the community had not changed except for an increase in the consumption of sugar and flour and the introduction of tooth brushes. This report was obtained from "The British Dental Journal" 46: 86, 1937.

In Peru Dr. Price had a wonderful opportunity to study the skulls and skeletons of ancient peoples who had been buried along the seacoast. These ancient graves had been robbed to get the gold buried with the bodies. The skeletons had been thrown upon the ground but were excellently preserved because of the dry climate.

Dr. Price made facial measurements on several hundred skulls and found that, these ancient people showed little evidence of nutritional defects such as dental decay, arithritis, etc.

He then sought higher altitudes, being able himself to ascend the mountains as high as 12,000 feet. He was unable to go any higher himself, but observed many natives who lived at altitudes as high as 16,000 feet. They were almost perfect physical specimens. Dental decay was practically unknown among them. What is of great interest to us, was that each Indian carried a bag of food with him and that this food consisted mainly of sea kelp and dried fish eggs from the sea. He learned that each trading post stocked this kelp and dried fish eggs. He also learned that it required a month's journey to make the trip to the seacoast to secure the sea kelp and the fish eggs.

In Africa Dr. Price found many of the natives to be seven feet tall. He inquired, through an interpreter. The answer was that they eat the soul of the animal. On asking what was meant by this term, he was informed that the soul was the dark meat in the side of the animal which Dr. Price realized was the liver. They learned to eat the liver by watching what the lion eats when he killed a Zebra. He invariably rolls the animal over on its side and starts eating at the right flank so as to get at the liver.

Dr. Price asked some of the northern Indians what the hunter took home when he had killed a moose. The answer was that he drank the blood himself, and took home the liver and the long bones of the legs. They make milk for the baby from the bone marrow.

All of which indicated that primitive peoples everywhere have learned the lessons so essential to their survival. They have learned through centuries of experience but they, like more civilized peoples throw away the tried and true customs of their ancestors for the more tasty food of civilization, when the opportunity arises.

The perfect health, physique and teeth of the primitives, disappear with access to the food chiefly characteristic of our people—namely, white flour and sugar.

The South Sea Islanders, who a few years ago were spoken of as the most beautiful race of people on earth, now are decimated by tuberculosis. People who never had a cavity in a tooth now have teeth in very bad condition. One would wonder at their ever having been famed for health and beauty if it were not for the existence of some, still in that condition, living on out-of-the-way islands still inaccessible to traders with their modern foods.

Neither are the Indians or Eskimos immune to the bad influences of civilization, for today one must penetrate past the frontier of the white man and his foods if we are to find these people in their former state of health.

Comparatively Recent and Drastic Changes in Mode of Living

It wasn't so long ago that we emerged from the primitive status. If we are predominately Nordic (north European) or Alpine (middle European) it was but a few hundred years ago, and but little longer if our strain was Mediterranean in origin.

A few hundred years is only about three times as many generations and we know how little a few generations influences the characteristics of a plant or of a strain of dogs

Nor are we so different either. We wouldn't show any more advance than do our plants and our animals in an equal number of generations, were it not for our ability to imitate, and to transmit from one generation to another the things that have been learned in that and preceding generations.

Our great advance came with the art of printing. The printed word served us better than our memories could and from the accumulation of generations we came to know a multitude of things which would never have developed or would have been forgotten but for this blessing. After we had accumulated enough facts, and recorded enough observations, the foundations of science were laid. And from that beginning the advance was rapid. What a difference in the world of 1838.

In 1838 sugar was hardly known. For sweetening honey was almost universally used and there wasn't as much of that then as now. Railroads had just begun. Tractors and harvesters were unknown—new land was broken by hand, or by oxen and a single plow. Refineries for sugar and mills for flour were things of the future. What a difference this last hundred years has made.

Today we eat food grown, we know not where. Steamships, trains and trucks carry food from all parts of the world to the consumer—where a few generations ago the inland regions of countries were sparsely inhabited, now these regions are able to and do support a vast number. Our transportation facilities and our agricultural machinery have been the means for this change.

This change of location of our people from coastal regions to inland regions has also changed the diet of the people. Nordics who for centuries lived on sea food as the principal article of diet now live principally on inland grown food, while the Alpine who lived mostly on meat either from herds or from game, now lives the same as everyone else, mainly on plant food—a change from protein predominance to carbohydrate predominance.

The Mediterranean, the product of an older civilization and of an agricultural climate, lives about the same now as his ancestors did except for the difference between natural and refined foods.

Races of people acclimatize themselves to changes eventually or disappear from the face of the earth. Both of these things have happened numerous times in the past but never was there such a general and drastic change in the mode of living and in the things we eat as has taken place in this last hundred years.

Refined Foods

The change is more than appears on the surface. Now we know that refined foods have been deprived of certain food principles which we didn't know existed a hundred years ago. These lost essentials are the vitamins and the minerals. Already, we have begun to realize their importance and manufacturers are feverishly advertising irradiated milk, flour, yeast, oil and what not, attempting to put back artificially what was already there before they took it out.

This applies to the vitamins of which fourteen are known today. Now the public is vitamin conscious. Vitamins have been harped on so much that the pendulum has swung too far. Massive doses are recommended for various ailments. They try to correct in a few doses, nutritional injuries which took years to develop to the point of recognition—which is all well and good if the method works and they are not barking up the wrong tree.

There is much evidence to show that the beneficial action of cod liver oil is as much due to the sea mineral content of the oil as to the vitamin A and D content. A supporting fact is the difference in action between the cod liver oil concentrated, in which the oil has been nearly all removed, and the whole cod liver oil—yet both have the same vitamin content.

Because of our omnivorous type of digestive system it doesn't seem to matter greatly whether our food is mostly of animal origin or mostly of vegetable origin.

What Do Our Foods Contain?

The really important factor of nutrition is "what do our foods contain?" This knowledge is essential from two standpoints. Our foods must furnish all the various materials needed for the efficient function of our bodily mechanism, and they must not contain substances which serve as misplaced monkey wrenches in this same mechanism.

Then the science of nutrition sums its efforts up in the determination of the essentials for minimum and maximum body efficiency both as to quality and quantity, and in the determination of those substances deleterious to body efficiency.

McCullom, page 8 "Food, Nutrition and Health" 1934 sums up the substances indispensible for normal nutrition. "The task is not yet complete but provisionally we may define the simplest possible adequate diet as composed of the following:

1. Not more than eighteen of the twenty-two known amino acids. It has been shown by tests on animals that four of the list of known digestion products of proteins may be synthesized in the body. It is very probable that not more than eight or ten of these substances are actually essential but it seems best to assume that all which have not been conclusively shown to be capable of synthesis in the body be provisionally regarded as essential components of the food.

2. A source of glucose other than that which can be formed from protein or fat, since ordinarily not enough would be secured from these sources.

3. The eleven inorganic elements—it is now certain that at least eleven mineral elements are indispensible for normal nutrition. These are sodium, potassium, calcium, magnesium, chlorine, iodine, phosphorus sulphur, iron, copper and manganese. Of these we have much knowledge of the functions which they serve in the life processes. The absence of any one in the food, the others being provided, results in nutritive failure of a characteristic type.

4. At least six vitamins.

5. Linoleic acid.

So far as we know now, if we had a mixture of these thirty-seven simple chemical substances in the right proportions they would constitute an adequate diet for the promotion of growth or the maintenance of health, reproduction, and the suckling of young to a state of independence.

It is again emphasized, however, that our knowledge is incomplete."

Professor Sherman of Columbia University adds three more elements to this list which seem highly probable to be essential to the human economy. These are cobalt, zinc and arsenic.

As time goes on it does not seem improbable that all the elements which are normally found in natural foods play important parts in the body chemistry. What we have had for thousands of years undoubtedly produces a dependency of our organism upon these trace elements.

All of these thirty-seven or forty materials are found in the average varied American diet except some of the mineral elements.

Because of the change produced by our modern ways of living in the nature of our foods from animal and sea foods to less of these and more of land grown foods, we have changed the content of our foods in respect to the minerals present.

This change is obvious because even in past eras the sea was far richer in minerals than the land because of the continuous leaching process exerted by rainfall. This change is the greater now that our land has been cultivated for varying lengths of time, some of it for many years. This cultivation has accelerated the leaching process, not alone from rain-water, but also because the plants grown on the soil have taken unto themselves much of the soluble mineral content of the top soil.

Under natural or wild conditions the plant life would die where it was grown and replace what it had borrowed from the soil, but man removes most of the plant life permanently from cultivated soils and replaces if at all, only incompletely by means of fertilizers.

We find that the older text books still give tables which are supposed to give the mineral content of the different kind of produce. The expense of a complete analysis is so great that it is rarely done. As a consequence many of these tables are the result of but one analysis performed years ago. No attempt has been made to discover if analyses of the same kind of plant grown upon different soils would show different mineral contents, probably because results obviously would be different; yet many intelligent people state without thinking that cabbage is rich in this mineral and carrots in that mineral, and so on down the list and still do not have the faintest idea as to where the particular vegetable was grown.

We are more accurately informed as to the mineral content of soils, for dollars and cents depend upon it. The farmer knows how to take better care of his cattle and poultry than he does of his children.

He sends samples of his soils to the County Agent or to the State University for analysis so that he will know what to add to it to get better crops. He feeds rations to his stock as recommended by the same sources. He keeps track of the weight gathering propensities of his beef; the egg laying ability of his hens; the reproductive rate of his cows. He requires efficient body chemistry of his stock yet his children like Topsy just grow.

Many state universities recommend the addition of kelp to the grain feed of the cattle of their states, but as yet no university has recommended the use of kelp for the human beings of their state, still many of the disease conditions which they try to avoid in cattle by the use of kelp are many times more prevalent in human beings.

The Effects of Inadequate Nutrition

Medicine is gradually turning from the idea, fixed since Pasteur, that the invading bacterial organisms are more important in the causes and cures of disease than the condition of the host.

We are surrounded by bacteria, good and bad. Numerous cultures can be made from the mouths, intestinal tracts and the skin of the healthiest of us, at any time. Yet we don't all get sick.

It is true that some organisms are so virulent that practically anyone innoculated with them will become diseased, but fortunately for us they are comparatively few and isolated as to locality as compared with the common types of bacteria.

We are sometimes immune to these prevalent types of bacteria for two reasons; one being that our own physical organisms when functioning efficiently are resistant to the invasion of bacteria; the other is that the bacteria themselves must be vigorous and healthy to make an invasion.

Bacteria, like people, must have the foods and environmental conditions they need in order to be vigorous. The mouth or intestinal tract of a healthy person is not suitable for the well-being of the bacterial inhabitants.

They must live a few generations in the mouths or intestinal tracts of people not in good health and not resistant to disease before they can develop into virgorous and dangerous bacteria.

Colds and other infectious diseases such as tuberculosis are practically unknown among the primitives that do not have contact with civilized peoples. Their general resistance has been so good that any invading bacteria have little chance to find suitable hosts for their growth and development and as a result there came to be none of these dangerous bacteria left.

But with the advent of civilized man and his good-tasting foods, came disease in its most virulent form. The resistance of the primitives went down. The virulity of the bacteria became high, having been carried to these primitives by a suitable host, and the defensive forces produced by the body itself as a result of no previous exposures and innoculations were nil.

Eskimos never have colds until the white man brings them to them and then they are really serious. They often die from these colds.

Recently a young man of Tristan da Cunha went to England. He liked our modern foods and ways of living so well that he wished to stay, but he caught a cold and died. He had not had the opportunity to build within himself an immunity to this common infection, and the resistance to disease which he undoubtedly had in his native surroundings left him when his foods no longer contained those things from which efficient body chemistry is procured.

We might change the slogan of battle between men to apply to the battle between man and bacteria. Such would be "The best offense is a good defense."

Dr. Cavanaugh of Cornell University to whom much of the credit is due for recognition of the importance of adequate nutrition for cattle tells of this experience.

Mastitis is a disease in cows which is identical to caked breasts in women. It affects many cattle each year. The financial loss resulting is enormous. Knowing that the disease was infectious, all attempts to arrest and overcome it were by the use of cleanliness and germicides.

However in spite of all precautions taken the disease became more prevalent than ever. A peculiar thing about the disease was that nearly always only the best cows became infected; cows that were the best producers of milk and the highest in butterfat production.

A professor of animal nutrition in Germany performed an experiment. He placed the highest producers of a herd in quarters where the most sanitary conditions prevailed. The building was of glass and tile. Each animal was bathed daily with germicidal solution. Food was sterilized and the most critical care taken of them. Thoroughly sterilized milking machines were used and the attendants were as immaculate as hospital orderlies. The rest of the herd were kept under ordinary conditions. No special care was taken not to transmit infection from one cow to another. But under these extremely sanitary and unsanitary conditions the percentage becoming infected with mastitis remained about the same. Also the high producing cows were affected to a greater extent than the other group.

Not until the protein intake of the cattle was lowered and the carbohydrate intake increased, was mastitis conquered. The reason the best producers were affected more generally than the others was because

they were forced to give more milk by feeding increased amounts of protein; and since this is usually obtained from fish meal which is an animal protein, assimilation was not so good in a digestive apparatus intended only for plant food. Now the trail became clear—high protein—digestive disturbance—lowered efficiency of body chemistry—less resistance to bacterial invasion—mastitis.

When we consider how different our lives are from those of the primitives, and how we violate the principles of dietetics in every possible way; it is not so strange that disease is rife among us. It is rather strange that so many are well. Not so strange that 98% of our school children have dental decay, but strange perhaps that 2% do not have decay.

Now how can we be sure that our food is of the kind we need to supply our needs. Unless we eventually get to growing most of our food under glass the problem is simple, for certain of the minerals; all of the vitamins, the carbohydrates; some of the proteins and fats are furnished by plant life anywhere. All but the minerals are composed of three things chiefly, oxygen, hydrogen and carbon. These things are obtained from water and air. The vitamins are obtained from the action of the sun upon the plant substance.

So, as far as these things are concerned, we have a plentiful supply if we eat of a small variety of vegetables and fruits. Both root vegetables and leafy vegetables are important; but we must make sure we do not lose most of the food principles contained in them by the means we use to prepare them.

To make sure that we do not lose some things that we must have we should eat some of our fruit and vegetables raw. Not a great deal is required. A little salad made of raw and leafy vegetables each day will serve the purpose.

The rest of our vegetables may be cooked, taking care to preserve the contents of these vegetables as much as possible.

Potatoes boiled with the skins on preserve more of their mineral content than if they were peeled, but baked ones are still better in this regard. Since most of the mineral and vitamin content is in or near the skins one may do well to eat them if they are not distasteful.

Since this is not intended as a cook book, we will leave this subject of cooking except for the foregoing example.

We must have some protein from animal sources in our diet. We may obtain this from meat, milk, eggs, cheese or fish. In so doing we also supply the animal fat necessary.

The foregoing classes of foods supply the bulk of the mineral content of our foods, namely calcium and phosphorus. Much ado has been made in publications for large amounts of calcium in the diet. Again if we but leave the calcium in our foods rather than taking it out by refining and improper cooking, we don't have to pay much attention to the calcium for it is hard to find foods which do not contain calcium and phosphorus. Both are essential to plant and animal life. It isn't the calcium or phosphorus intake which makes for the deficiency of these materials in our teeth and bones, it is rather the assimilation of these materials from our foods that is usually at fault.

Ce-kelp—A Protective Food

We have described how to fulfill the requirements of an adequate diet except for the trace minerals. There is no way to be sure that all of these are in the diet unless we make sea-food a part of our daily intake.

There are very few who would eat sea-food every day unless they had to. We much prefer other things for a steady diet. Then again there are millions of people who couldn't eat sea-food daily if they would unless they ate it canned. This is where Ce-kelp comes in.

The mineral equivalent of three-fourths of a pound of animal sea-food is one tablet of Ce-kelp. If we take a few of these tablets every day we know

that we have an ample supply of the trace minerals in our diet. If we take too much it doesn't do any harm. Our body will take only the amount needed. Many millions of people depend upon kelp for food. Some eat as much as one-half pound daily. In Japan especially is this true, and by the way, goitre is practically unknown in Japan.

Now what must we not have in our diet—for the science of nutrition not only tells us what must be in our diet, but also deals with the substances, foods or drugs which affect the assimilation of the necessary food substances.

Monkey Wrenches in the Machinery

White flour, alcohol and sugar are the three greatest food pirates we have. They are named in reverse order to their importance.

White flour is not bad in itself. The trouble lies in the fact that in eating of it we fill up space which might better be filled with something which could do us more good. The vitamins and the minerals of the grain have been removed in the process of making white flour. When we eat it, it just means that the other foods are depended upon to supply their quota of these essentials, and if they can't the owner of the appetite suffers.

The worst of it is that he doesn't know that he suffers until he wakes up some day to find that it is hard to bend over. He thinks he is just robust, others think he is fat.

The effect of alcohol upon the central nervous system is well known so we'll skip it. What concerns us from a nutritional standpoint is the effect of alcohol upon the autonomic nervous system. Its action is to depress the sympathetic nervous system and hence to excite the parasympathetic nervous system.

Since the autonomic nervous system has charge of the assimilation of food materials, the balancing effects of assimilation are thrown out of adjustment. Those foods whose assimilation is controlled by the sympathetic system are incompletely assimilated while an excess of those materials controlled by the parasympathetic is assimilated.

Since the action of alcohol is similar to the action of sugar, these effects will be given in more detail after we take up the question of sugar metabolism.

Sugar

It is the nature of human beings when confronted by catastrophe to first look for an easy way out. It is only after long continued failure to find such a way that man will get right down to "brass tacks" in his search for the answer to his problem.

Dental decay, while in itself not the most serious of these problems, is one of the foremost in numbers of people affected. Millions of dollars have been expended in research as to the causes of dental decay, yet we seemingly are no nearer the solution than we were forty years ago when Miller brought forth this bacterial theory. We have a great amount of evidence to show that dental decay is the product of civilization, yet we have done very little to find out what the factors of civilization are which account for this state of affairs.

The causes of dental decay are the same as for other degenerative diseases. Anything that affects the teeth affects other parts of the body. Sugar being the greatest factor in the degenerative diseases deserves attention. Let us take up this question of sugar. What is it anyway, and what part, if any does it play in this tragedy of civilization?

First, it is one of the chief commodities of the world. The most prosperous nations use the most of it. The United States leads in the consumption of it to the tune of 115 pounds per capita yearly.

Second, the use of sugar is increasing annually; yet one hundred years ago it was hardly known. It may be but coincidence that it is in this period the degenerative diseases which include dental decay have increased alarmingly.

It is found in many natural substances such as fruits and vegetables, and to a slight extent even in meats.

It is essential to life, in fact our carbohydrate foods are transformed to sugar in our digestive tracts before they can pass through the intestinal walls into the lymph channels and into the blood stream.

Since sugar is so valuable to us then why suspect it as a cause of our health problems? Perhaps a closer examination of processes of digestion will reveal why. About 70 % of our food intake finally ends up as sugar, but this process is a slow one and almost continuous. In the 48 hours that food takes to pass through the digestive apparatus we will take food perhaps six times. This furnishes us with a continuous, but thin trickle of sugar which then passes through the intestinal walls without let or hindrance. At the same time other products of digestion are being formed also. These products pass through the intestinal walls too, but not so readily as sugar. After sugar reaches the blood it travels with it to every part of the body to furnish energy to the individual cells.

It is important that the cells have this continuous supply of sugar, so important that the largest organ in the body, the liver, is a storehouse for it in case the supply is too great. Likewise when the blood supply begins to get low this sugar is released in order to keep the blood sugar at a nearly constant level.

It has been calculated that the total quantity of sugar in the blood is about one teaspoonful. This constant quantity is so important that if the quantity should be reduced to one-half teaspoonful or increased a like amount, coma would ensue.

Through the centuries our body chemical apparatus have become adjusted to a comparatively constant amount of sugar intake. Our sugar carburetors have been held wide open for so long that we have no means of closing the openings.

Instead of the constant thin trickle of sugar from the slowly breaking down carbohydrate content of our food, we have not only this but also frequent floods of sugar, already in a state fit to go through the intestinal walls. To this we have no defense. Readjustment of our chemical apparatus to changed conditions takes thousands of generations. A general change in dietary habits taking place in one or two hundred years partakes of the nature of sudden disaster.

Insurance statistics show that over 50% of the people of the United States who die between the ages of 55 and 64, die of diabetes. Diabetes is a disease which effects sugar metabolism, and authorities are agreed that the overload produced on the isles of the pancreas by excessive amounts of sugar in the diet, is a contributing, if not the chief cause of this trouble.

Another effect of this use of refined sugar is upon the concentration of other substances needed in the blood, not only must the various cells of the body have sugar for their energy, but they must have building materials for growth and replacement. Because sugar enters through the intestinal walls into the blood stream more easily than phosphorus, and because the blood in sugar eating individuals is nearly saturated with sugar, some of these other needed materials are kept out. This results in a lowered calcium-carbono-phosphate content of the blood and the structure of the hard tissues of the body suffers as a result.

The likelihood of an individual to have dental decay can be determined by the analysis of the blood for its average level of calcium-carbono-

phosphate, for this is the material from which teeth and bones are made, and from which material used as replacement for worn out cells is obtained. A low mineral level results in a loss of immunity to dental decay, both from a nourishment standpoint and from the fact that the neutralizing power of the saliva is in a measure lost, since this depends upon the mineral salts in solution, which the saliva obtains from the blood.

As a nation we have been in a similar predicament. We deforested the land and as a result our soil surfaces were unable to store water to the degree they had in the past, and as a result the nation also had disastrous floods of a substance which used correctly was essential and life giving, but when out of control was disastrous and death dealing.

Like the nation we must restore the continuous thin trickle that our body mechanism may once again function normally and safely.

Salt

The question of salt is a very important one when discussing nutrition. Ordinarily we think of salt as the kind we fill our salt shakers with—the kind advertised in the grocery stores, and the kind known as sodium chloride by chemists.

But there are many salts—all of the metals form salts. There are besides salts of sodium, salts of magnesium, manganese, iodine, iron, aluminum, potassium and many others.

In nature these salts are seldom found alone. When we used to obtain salt as a seasoning for food, we obtained it in hollows of rock along the sea where salts were encrusted, having been left there by the evaporation of sea water. There were many salts in the material we then used.

As man became more inventive, he learned how to mine salts. He also learned how to separate the salts of sodium from the other salts so that he had a pure substance for commercial and food use; so that now when we ask at the grocer's for salt, we get pure sodium chloride; or we get pure sodium chloride with a little sodium iodide added if the box says iodized salt; or if it says free running, we get a trace of magnesium in it.

In order to know about the place of salt in nutrition we must know about the use made of it by the body.

The body fluids normally contain several salts in solution. Those in the blood being mostly salts of sodium, and those within the cell walls being mostly salts of potassium.

These salts serve to keep the density of the body fluids up to a certain level; a very important function, for the exchange of fluids containing nourishment from the blood stream to the cells is affected by any change in density of the fluids. If we have too little salts in the blood stream the body cells tend to swell and become engorged. If we have too much salt in the blood, the tissue cells tend to shrink.

Fortunately we were made with a regulatory apparatus so that we might not have too much or too little salt in our food. We were endowed with a taste for salt. When we needed salt, food tasted better when it was salty, so we sprinkled some on. At other times our food was salty enough so we let well enough alone.

This sense of taste for salt served us well for thousands of years, or until we began to supply our craving for salt with just one salt, instead of many. With many of us our regulating mechanism now doesn't get a chance to function correctly. Our normal requirements of sodium chloride are about two grains daily but instead we take in our food more nearly an average of twenty grains daily of this one salt, and only so much of the

other salts as we have accidentally succeeded in retaining in the food during the cooking process.

We still have only one taste for salt. We can't distinguish between the salts to any large extent by means of our taste buds, so we have had no way of knowing that our bodies were calling for several salts instead of but the one that we supplied.

Now as to the effects of the largely one-sided salt diet. The most obvious effect is disturbed elimination. Acne, skin eruptions, constipation and diarrhea are concomitant with one-sided salt intake. Wounds are slow to heal, and a disturbance in the blood content of four other very valuable salts is caused. These are salts of calcium, phosphorus, potassium, and magnesium; salts of the utmost value in the nutritional requirements of the cells of the body.

It was learned long ago that if the use of sodium chloride, other than that found naturally in foods, was discontinued and a vegetable salt substituted, a very high blood pressure would almost immediately drop several points and remain improved. What actually happened was that several salts which the plant had stored in its own tissue were gathered from the plant and substituted for sodium chloride.

Much of the good results that come from the daily use of Ce-kelp are due to the fact that Ce-kelp supplies all of the salts needed by the body and not just one of them. A good way to increase the good results obtained by the daily use of Ce-kelp is to cut down on the use of sodium chloride. Many foods are improved in flavor with powdered Ce-kelp used as a seasoning, both in cooking and sprinkled on salads, tomatoes, meats, etc. It is interesting to note that Ce-kelp, though very salty in taste contains only about 7/10 of a grain of soduim chloride to six tablets of five grains each. The other salts are just as salty in taste as is sodium chloride.

It is of further interest to know that we get sufficient sodium chloride for our needs in the common foods we eat. It is estimated that our average daily intake of food, without the addition of sodium chloride contains from four to five grains of this salt, whereas our needs are put at about two grains. Of course this need varies, being greater in summer than winter due to losses through the skin by evaporation. Since this water and salt loss is from the blood, the principal salts lost are salts of sodium.

In Germany it has been found advantageous to put all patients with tuberculosis of the bones on a sodium chloride free diet. Some of our own hospitals have been following the same procedure for several years with excellent results.

We waste much of the natural food salts in cooking with excessive amounts of water. Being very soluble, the cooking water tends to leach the salts from the food. Steam cooking or baking serves to retain the natural salts in the food to a much greater extent.

An old remedy for arthritis was to save potato water and use it as a beverage. The principle was correct. It is the same thing we do when we use Ce-kelp, but of course with Ce-kelp we do it better for Ce-kelp contains a greater variety of salts than does land grown vegetables.

Calcium-Phosphorus Metabolism

Up to this time we have barely mentioned calcium-phosphorus levels of the blood and yet it is the field that the writer feels that he knows most about. The balance of these letters on Mineral Nutrition will deal with this subject to a greater extent.

The writer feels that this subject is his special province and quotes no one besides himself, having spent eight very intensive years in research in this field. The writer doesn't wish to appear presumptuous but feels that by the very amount of work done and time spent almost any one would have

become an authority on the subject. He believes that no one else has even approached in amount of time and work that of his own.

The writer had been following the work of the same Dr. Price as mentioned previously, for several years. Dr. Price had been doing blood analyses for quite a while, thinking that he might eventually discover from the levels of the calcium and phosphorus the difference between the people that were susceptible to dental decay and those who were not. He thought he had found the difference for a while but later discarded it for there were too many exceptions.

The writer, thinking that Dr. Price had the right approach to the problem took it up also. He got permission to take bloods for analysis in both of the hospitals in Muskegon. In this way he was enabled to compare many blood tests with other findings made by the medical men in attendance.

The first inkling of the truth came when he noticed that a few patients all had the same identical ratios of calcium and phosphorus, yet of all the others, there were hardly two similar in any comparative respects. These patients were all diabetics who were under close dietary supervision and were being given insulin.

These calcium-phosphorus tests all had the proportions of ten to four. That is if the calcium were ten milligrams, the phosphorus would be four milligrams. Another fact noted was that dental decay had ceased in these patients although there was evidence that each one had very much decay previously to treatment.

The thought occurred that possibly the body used a compound composed of these two minerals and that mineral matter, either calcium or phosphorus, in excess of the amounts that could combine in these proportions was useless.

With this supposition a table was made showing the level of this compound and the patients susceptibility or immunity to dental decay. It was found that when this level was high there was no decay and when low there was decay. It became further evident that there was a certain level that was the dividing line between these two conditions.

The next step was to learn how to change these levels to more desirable ones. Insulin was already suspected as of being of value in some cases, which gave the inkling that the endocrines had something to do with these levels, but not until it was found impossible to change the levels by means of calcium or phosphorus bearing foods.

It turned out that it was a question more of assimilation than intake, and that the use of endocrine products produced assimilation. It was in this way that it was discovered that one of the chief functions of the endocrines was in the assimilation of food.

The next step was to discover why the endocrines got out of order. It seemed logical that the diet had something to do with it. Vitamins were tried with no success upon the phosphorus levels and very little upon the calcium levels. It was not until the use of kelp was tried, that there was any success obtained in changing the phosphorus level, other than that previously obtained by the endocrine products.

Then we began to learn something of the importance of the trace or sea minerals in nutrition, and their need by the endocrines in order to function perfectly—and in order again that we might have better body chemistry.

Then further, it was discovered the part that body chemistry plays in health and disease—that it was much easier to prevent than to cure. And finally it was discovered that many of the so-called incurable diseases were not incurable at all. That the body could cure itself of most everything, if it had the proper chance—if the reasons for the lack of resistance to the disease were understood and the causes removed.

An understanding of the causes for the increasing prevalence of the degenerative diseases is considered by such authorities as Dr. Alexis Carrell and Dr. Victor Heiser to be a dire necessity if the white races are not to disappear from the face of the earth.

Adequate Nutrition

The writer believes the solution lies in adequate nutrition. A rather simple definition of adequate nutrition is a diet that contains all of the essential materials in adequate amounts, that the body needs, and which does not contain those things that interfere with the assimilation of these essential materials.

The mineral intake is undoubtedly the weak point in the first requirement of an adequate nutrition. The writer was much impressed by an article in the National Geographic of April 1927 entitled "The Chinese Farmers Since the Days of Noah" by Adam Warwick, from which the following is a passage—

"In the West, and more especially in the United States, 'man,' to quote Professor King, 'is the most extravagant accelerator of waste the world has ever endured. His withering blight has fallen upon every living thing within his reach, himself not excepted, and his besom of destruction in the uncontrolled hands of a generation has swept into the sea soil fertility which only centuries of life could accumulate . . . .'

"On the basis of the data of Wolff, Keller, and of Carpenter, or of Hall, the people of the United States and of Europe are (yearly) pouring into the sea, lakes, and rivers, and into the underground waters, from 5,794,300 to 12,000,000 pounds of nitrogen, 1,881,900 to 4,151,000 pounds of potassium, and 777,200 to 3,057,600 pounds of phosphorus per million of adult population, and this waste we esteem one of the great achievements of our civilization. Whereas in China all this is saved and returned to the fields."

The author of this article on China didn't realize that with this nitrogen, potassium, and phosphorus also went the same proportions of iron, iodine, copper, calcium, manganese, magnesium, and many other substances that were originally in the soils and though found in lesser quantities are of just as great importance to the human economy.

I am sorry to say that all of these things remain to be discovered yet by the profession as a whole. There is a truism that it takes twenty years after the discovery of anything before it begins to percolate through the profession. The writer feels that we are performing a great service to humanity in introducing these principles of good health to people and thereby hastening the day when such treatment will be given by the medical professions.

Index of Body Chemistry

One of the greatest things learned as a result of the calcium-phosphorus tests was that the test served as an index of the state of the body chemistry. The importance of this is recognized when we learn that hitherto there has never been a gauge or measuring stick of normal body chemistry. Previous to this test determination of the normal was purely a negative thing. If the subject didn't have some recognizable symptoms of disease, it was as near as we could come to gauging the normal.

When we had a gauge of normal body chemistry, it became possible to learn about the things that interfered with body chemistry namely sugar, alcohol, salt and the absence of essential foods as minerals.

Eventually we learned why deposits form in various parts of the body. We learned that the deposits are usually of calcium and that they come from uncombined calcium in the blood. Such is the case in depositing arthritis, kidney stones, tartar on teeth, impairment of the circulation, and cataract.

We learn by doing and observing. Eventually those who were interested in selling Ce-kelp saw that these deposits would lessen, that people would feel better, look better and that these deposits eventually would tend to disappear. Fortunately most of you by now have seen the things happen that I'm writing about, or even you wouldn't believe me. I think that with a little more on the workings of the body we can begin to take up individual cases that the writer has treated, together with the blood tests and an explanation of results.

Laws of Nature Govern Bodies of Men as well as Animals

We must remember that whatever the difference between men and animals, it is not a difference in the workings of our bodies.

Our bodies are animal bodies and are subject to the same laws as all animal bodies. To support this conclusion our bodies, the same as other animals, have only four senses of taste—sweet, sour, bitter, and salt. We also have appetites the same as other animals.

In natural surroundings and in respect to natural food, these four tastes and the appetite are all we need to select the kind and amounts of various foods needed by our bodies. All animals with the exception of man get along very well with the guidance of these gauges. Man used to also, but these gauges are thrown out of kilter when they have refined foods, highly seasoned foods and other means of preparation of foods which effectively disguise the natural flavors.

In reality our mechanism needs only three gauges for the selection of natural foods for the fourth, the taste of bitter, is for the purpose of avoidance of those things having that taste. In nature bitter things are poisonous or harmful. The taste of sour is important in that it calls for acid containing foods which may have importance at times for the purpose of acid-base balance and the oxidation of foods. The taste of sweet is important because it calls for acids, minerals, and vitamins as well as sugar, for these things are nearly always associated in natural foods. The taste for salt is important also for it calls for our supply of salts. These salts are of various kinds. In nature they are found together.

Further Progress in Knowledge Needed

But man has progressed to the stage where he has learned to prepare foods, to refine them, to make others synthetically, and by various means and methods to so disguise other foods that our taste gauges are all bewildered. Their usefulness as guides to foods does not apply to our modern foods.

It was thought that man must be totally different from other animals in this respect for it has been recognized that wild animals have unerring guidance in their food selection by their senses of taste and smell.

Some scientific people wished to know if such was the case, so an experiment was tried in Chicago. About twenty children between the ages of one year and six were placed in an institution under the closest of supervision. There was no effort to select certain kinds or types of individuals. They were the average run of children as found in that city.

Some were in good health, two had rickets, several had decayed teeth, and several were underweight. They were allowed to select their own foods from trays placed before them at meal time. There were thirty-six assortments on the tray. All were natural foods; that is, the meats were cooked, but not seasoned. The same with the vegetables except those served raw. There were no white flour products or sugar. Salt was separate in a dish of its own. As fast as a dish was emptied another with the same amount was replaced. A careful record was kept of the kinds and amounts of food eaten.

One child after coming in from playing in the snow ate eleven servings of lamb. The attendants expected disaster to follow this and other similar occasions, but not so. At the end of six years the health of all participants was excellent. Those having entered with rickets were cured. Dental decay was unknown, as were also colds.

The senses of taste and smell of these children were adequate to enable them to select the things needed for the welfare of their bodies, when applied to natural foods. They could rely on their gauges. They did not have a chemical to satisfy their sweet gauge when their bodies demanded vitamins and minerals, and they satisfied their gauge for salts with many salts, not just one.

The inside of our intestinal tracts is as much outside of our bodies as are those things external to our skins. Only after foods pass through the intestinal walls do these substances become a part of us. Like every other animal's body, our body allows in the main only four things to pass through these walls. In order of volume these things are water, glucose, amino and fatty acids, and salts.

The food substance needed in greatest volume is glucose or sugar. Because 70% of our food is broken down to glucose and because this glucose is so essential as fuel for our bodies, it has the right-of-way next only to water. When we put sugar into our intestines, it uses this right-of-way. Our intestinal walls have no mechanism by which it can be kept out. As a result other foods not having such an authorative right-of-way are kept out. The blood becomes too rich in sugar and too deficient in other essentials.

The mechanism in our bodies is not built to handle this flood of sugar. As a result many of our degenerative changes take place from this reason alone or in conjunction with others. Diabetes is the chief one, but the resulting mineral imbalance of the blood is responsible for pyorrhea, dental decay, arthritis and other degenerative changes.

Some of our most noted authorities have stated that death results usually from the breaking down of only a part of the mechanism. But for the breaking of a weak link the rest of the mechanism could go on living for many years. They have stated that our average length of life could be increased from 56 to 140 years if we knew how to live and applied what we knew.

Most of us have to lose health before we can find it. For we fail to pay much attention to our mechanisms as long as they give us no trouble. The ability to recover, even after the mechanism has been seriously damaged is truly remarkable. An old saying is supported by examples every day. "If you want to live long, get an incurable disease and take care of it." Probably Rockefeller was the best example of the truth of this saying.

It is too late to restore the ways of living of our ancestors, but neither is it necessary. Our civilization has advanced so fast and so far that it is now time to learn more about the things we have discovered, what their long-range effects are as well as the immediate effects.

We are similar to children who have been given dangerous playthings. They won't let us take them away, so we must teach them their rightful uses so that they will not injure themselves.

Statistics show that 60% of our elderly people succumb to some disturbances of the heart, blood vessels, or kidneys; 15% to disturbances of the lungs; 15% to cancer; 7% to disturbances of the stomach and intestines and only 3% to injuries and old age.

By learning how to live, by keeping our body-chemistry in equilibrium, these causes of death from breakage of weak links should be eliminated and more deaths result at advanced ages from the wearing out of the whole machine at the same time, like unto the "One Hoss Shay."