PROTEINS

THE STRUGGLE FOR THEM BY ALL FORMS OF LIFE, PREMISED ON THE FERTILITY OF THE SOIL

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IN our struggle for foods, those giving us energy (the fats and the carbohydrates) are plentiful. Those carrying life, giving us protection, and carrying on reproduction, i.e. the proteins, are scarce and costly. Starches, sugars, and fats are surpluses. They are the "go" foods. Meats, milk, eggs, and cheese are not on the surplus list. They are the "grow" foods.

I

Complete Nutrition Demands Not Just Proteins But Those Giving Us Certain Amounts of Specific Amino Acids. Carbohydrates Serve Interchangeably.

In their chemical composition, the proteins suggest a case of the carbohydrates into which nitrogen (also phosphorus and sulfur) have been chemically inserted. Those combinations are represented by unions of some two dozen compounds, called "amino acids," of which eight have been shown to be requirements as food for the survival of a man. Two more, added to those eight, are required for the white rat. The creation and delivery of amino acids, or the combining of nitrogen and sulfur into carbohydrates to give us our required proteins made up of the proper and complete collection of amino acids, is the foundation and the problem of proper nutrition. It is a problem of any life form whether that be the microbe, the plant, the animal, or man. Any healthy living tissue is possible only when it is supplied regularly with the different essential amino acids (constituents of protein) and in the required amounts of each per limited unit of time. Only by getting these essentials, i.e. the proper proteins, can the cells of any kind of body (a) grow or enlarge, (b) protect themselves from being taken over by other proteins (disease germs), and (c) reproduce their kind. Carbohydrates and fats do not carry forward these functions of the living tissue. They are consumed to provide energy. Proteins represent a struggle by every life form to obtain them amply. They are the common deficiency in the nutrition of most any form of life.

Animals and man take their foods as compounds. They build their body proteins from the collection of amino acids they eat as proteins in their rations or diets. Plants and microbes can build their body proteins from either elements or compounds. Therefore, they can take calcium, magnesium, potassium, nitrogen, phosphorus, sulfur, etc., from the soil; they can take carbon, hydrogen and oxygen from air and water, or from organic compounds; they can synthesize the carbohydrates by sunshine energy as only plants do; and then from those they can assemble the proteins as their living body tissues. It is that capacity of plants to assemble the proteins from the elements of the soil, the air, and the water that makes man and animals, who cannot do that, so dependent on the soil and the weather for their survival by means of the food and feed crops we grow. Those crops must not only give energy foods, but must also be rich in proteins if animals are to grow rather than to be only fattened by means of those crops.

The Majority of Plants Produce Carbodydrates. The Minority Grow Complete Proteins, and Then Only On Fertile Soils.

When our vegetable foods can give us fattened bodies so readily, we are merely recognizing the prevalence of carbohydrates and fats in what we grow and eat. We are slow to realize that plants make carbohydrates first, and make those with but few demands on the soil. But for plants to convert those carbohydrates into protein, which requires a biosynthetic process and not just a photosynthetic one, many fertility elements must be supplied to the plants by the soil. Those elements must also be in proper balance for such plant nutrition. Protein-producing plants require more of calcium, phosphorus, sulfur, magnesium, nitrogen, potassium, and of all the other essentials—including the so-called "trace" elements—from the soil. These fertility elements, then, in their rates and ratios of going from the soil into the plant root, determine whether the crop is producing the amino acid combination in the proteins which will serve to grow, to protect, and to reproduce man and his animals. It is the soil fertility on which our bodies and the health of them are premised very much by way of the proteins. Plants, too, in their growth, in their freedom from disease, and in their seed yield for reproduction, depend not on the carbohydrate bulk they produce by the weather mainly, but on the proteins which they can synthesize only when given the help from the fertility of the soil. Thus we say, "Those protein-producing crops, like the legumes, are hard to grow. They fail on many soils."

The problem of proteins in our food supply is therefore one of growing them into our vegetation. Most of us prefer to let the animal harvest its proteins from that vegetative source so that we, in turn, can harvest our proteins from the animals in the more complete protein forms of meat, milk, eggs, etc. To date we do not really know how to feed our plants so they can provide the proteins in balance for growing either themselves or our animals. Nor can we feed young animals well enough to grow them with marked success as is suggested by the animals' immaturity when we start fattening it as "baby beef." We do much better in "fattening" older animals, especially if they are the castrated males. Even for that, in most areas of the country, we face the problem of importing some "protein supplements." The costs of these bring on the universal problem of getting "cheap gains" even when only fattening. Our soils on which we have been producing most of the agricultural crops are, then, not giving high concentrations of proteins in these plant products. Even those proteins, as we measure them crudely by measuring only the nitrogen, are often deficient in some essential amino acids. They are, therefore, calling for protein supplements when used in the ration or diet.

Corn and wheat grow starch, a carbohydrate. They bring fattening potential but do not sythesize proteins complete enough in all the amino acids required to grow, to protect, and to reproduce animals or man. Our soils, therefore, determine the distribution of microbes, plants, animals, and man in their respective ecological patterns over the country. We, like other forms of life, are, therefore, what we are because of where we are, and as the German scientist put it "Mann ist was er esst," or we are what we eat. In that, the problem of their quality is the problem of the proteins, which is not so much a problem with the carbohydrates.

Only Limited Areas of Our Virgin Soils Grew Proteins Enough To Feed the Bison.

Soils are weathered from the rocks.

Soils are a temporary stopover by rocks on their way to solution and to the sea. Our vegetation is nourished by that weathering process extending itself in a long-time result. Soils represent different degrees of development of the rocks into soil and solution according as the rainfall and the temperature, working on the rocks as parent material, have carried the processes forward. With little rainfall in the western United States (east of the Coast Range and Sierras), the rainfall pattern with its increase on coming eastward gives increasing degrees of soil development. More rainfall means soils less and less like the rock of their origin. It means more clay. It means more fertility on, and exchangeable from, that clay. But after the maximum of that is reached, like that in the soils in the Mid-Continent, (about the 98th meridian of longitude), then, the higher rainfall means less soil fertility left in the soil. This is the situation in the eastern United States.

The Mid-Continent with its high protein-producing power in the soil grew the "hard" or "high-protein" wheat. It grew the grass. It grew the American bison of the past and it grows the beef cattle of today. To the west of the Mid-Continent there is less protein-production in the lesser crop yields under scant rainfall. To the east of the Mid-Continent there is generous crop production under the generous annual rainfall. But those crops are not producers of proteins. They guarantee no more than "fattening" effects, even when coupled with a "protein supplement" brought from other areas.

The forest crops in the eastern United States represent less nutrition than do the grasses in the Mid-Continent. Cleared forests replaced by grasses grown on those soils mean grass that is not the protein-producing equivalent of the grass grown in the Mid-Continent. Grass in the latter region grows cattle and sheep. They are bodies of high protein contents. Grass in eastern United States and the corn, or other grains, grown on those soils more highly developed by heavier rainfalls, fatten those cattle. They fatten the hogs of which the short life span puts them into the hands of the butcher before their untimely death on our hands from a fattened and shortened life.

(To be continued in next issue)

A GOOD "SOAPING"

By J. M. Eleazer

While we were on a trip one time a friend told an unusual story that typified his nature to save.

For 50 years he had used the same shaving mug. And each morning for the past 30 years, after shaving, he had taken the unused lather out back and poured it by one of two Japanese persimmon trees he had planted, one on each side of the steps. The land and exposure were identical. But one of the trees was over twice as large as the other. The big one had gotten that tiny bit of potash every day that's carried in soap.

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PART II

(Continued from July issue)

ONE needs only to scan the last dozen Yearbooks of the United States Department of Agriculture in their series of agricultural subjects to see that the maps of the rainfall and the temperature combine themselves to make the soil map. Then one needs only to look at maps of crops, animals, and many other things to realize that those maps are literally made by the soil map. The high concentration of farms in the Mid-Continent is an outline of the virgin grass area of the country. That is also an outline of the Prairie and the Chernozem soils which result from the moderate rains in the temperate zones under rainfall-evaporation ratios ranging from 60 to 100 percent. This rainfall-evaporation map makes the soil map, which, in turn, makes the grass map, the crops map, etc. One needs only to scan the maps of crops, animals, and of all the output of agriculture to see that the soil—made by the climate—rather than the climate itself determines what grows. Crops and animals grow according as the soil and its fertility nourish them rather than how cold or warm, or how wet or dry they are. It is the internal, nutritional comfort and not the external, meteorological comfort that decides how healthy we grow.

The pattern of the soils, then, as they are fertile enough to grow crops of ample proteins along with the carbohydrates, or to grow only carbohydrates, determines the feed and food value. That pattern determines whether the food is really nutrition for health, or whether it is only filling, fattening, and fooling in its services when we eat it. During our neglect of maintaining the fertility of the soil while going westward over the country, we have been mining the soils of their protein-producing power. When the high-protein crops failed, we found crop substitutes which were judged by the vegetative bulk they produced. Their **quantity** was considered sufficient criterion for their adoption and continued use. Their **quality** production as nutrition was disregarded. We have, therefore, accepted crops which grow much bulk of carbohydrates but little protein. We are growing crops that are literally fattening themselves into larger yields per acre. Shall we expect little more than the fattening of castrated animals to result from the feeding of such? Those crops of lower protein concentration are failing in their own seed production. They are bringing on a kind of self-sterilization. Shall we not expect failing reproduction of our animals and see reason for pinning our hopes on artificial insemination? Shall we not expect midget or dwarf calves? Are we alarmed at the report that human sterility affects more individuals now than are affected by all the many degenerative diseases combined? Will those human irregularities in growth, in health and in reproduction not map themselves out in the United States according to the soil pattern, when proteins are considered and when our shortening life lines and reduced transportation of food compel us to be nourished more locally and from more limited soil areas?

Diseased Teeth Suggest the Climatic Pattern of Soil Fertility As Their Pattern.

When the soils of the Mid-Continent and West are known as the "pedocals" i.e. soils of calcium, and when the calcium or lime in the soil is associated with proteins produced by vegetation, should we be surprised that the highly developed, and acid, soils of our eastern states do not grow legumes, and do not produce the protein feeds and foods? As the soils farther east are more highly developed under the higher rainfalls east of the Mid-Continent, the calcium, or lime, is washed out of them. Protein-producing crops struggle to get enough lime and other fertility elements to grow their required proteins. Crops are less able to protect themselves against fungus and bacterial diseases by means of the proteins which they can synthesize for that purpose only when the soils are amply fertile. Plants make seeds and make more plants like themselves only when they can create plenty of the protein. The problems of increasing plant diseases and lowered seed yields are therefore premised on the fertility deficiencies of the soil. Shall we overlook human ailments possibly in similar patterns?

For the function of creating proteins, the soil's capacity for holding readily available, or quickly exchangeable, nutrients must be loaded by calcium to nearly 75 percent. Thus, while the soils have lost their calcium under the higher rainfalls washing it out—but giving enough rain for bigger crop yields—they have lost also other nutrient items like magnesium, potassium, etc. These latter nutrients, however, have been lost relatively less rapidly than has the calcium. The potassium serving in the plant's production of carbohydrates, is lost relatively not as rapidly, as is the calcium, serving in the plant's conversion of those carbohydrates into proteins. There is, then, a wide calcium-potassium ratio in the fertility of the soils in the Mid-Continent and West where protein is grown. There is a narrow calcium-potassium ratio in the fertility moving from the soil into the crops in the East and on soils growing mainly carbohydrates as their bulk Thus, in the suite of soil fertility elements active in their entrance into the root, there lies the control of protein abundance and protein shortage for ourselves and our animals for which the agricultural crops are the basic source or supply. We are thus starving for proteins and are fattening on carbohydrates where the climatic forces in their pattern have either not yet developed our soils or where those forces have already developed them too highly to nourish us properly for growth, good health, and normal reproduction. We are not so near starvation for proteins in the limited area of soils of the Mid-Continent which are better balanced in fertility because of the moderate climatic forces there.

Shall we be surprised, then, when a survey of the condition of the teeth of the inductees into the Navy during World War II revealed the least number of caries per mouth of these young men in the Mid-Continent, i.e. on the better protein-producing soils? While in the longitudinal belt of the Mid-Continent, viz. two states wide and west of the Mississippi River, the number of total caries (average) per mouth was 12.08, that figure rose to 13.10 for the next similar belt of states on the West. It rose to 15.50 for the Pacific Coast States. On going east from the Mid-Continent and its 12.08 caries per mouth, the figure for the belt of the states just east of the Mississippi River rose to 14.95. It went to the high figure of 17.55 for the states nearest the Atlantic. In the New England states alone it went to 21.00. Thus the map of caries in the teeth of nearly 70,000 young men of a mean age of 24 years is in such close relation to the soil fertility map for protein-production that these facts bring us around to see that healthy bodies are related to the proteins as the soil produces them. We have health, then, according to the quality of the crops we grow, and not according to their bulk in tons or bushels. Proteins are pointing out that they are, after all, not matters of technology or economics. Rather they are a biological struggle premised, in the last analysis, on the fertility of the soil.

II

Nature's pattern exhibiting the growth of different amounts and qualities of proteins on soil acording to differences in its fertility demonstrates the magnitude of the problem of providing ourselves with complete proteins through our own agricultural production. It suggests that the prevention of hidden hunger for proteins should offer more hope than the diagnosis and cure of it. It suggests that good nutrition via fertile soils offers more for health than do therapies administering drugs for relief.

The Science of Nutrition Is Not Yet Able to Specify the Quality of Our Diet. Much of That Must Be Trusted to Our Management of the Soils That Grow It.

A specific cause demonstrated by the therapy of a specific compound is always the most scientific kind of procedure. Fortunately, science has made much progress when it lists the required amino acids as constituents of the required proteins. It has also specified vitamins, even though they show their essentiality mainly in connection with the metabolism of energy compounds. Because nutrition is complex and the kinds of proteins are numerous, many of the details of the synthesis and functions of them remain to be untangled. But with vitamin therapies moving forward to demonstrate marked nutritional differences, and with protein hydrolysates and the specific amino acids following with similar demonstrations from their separate ministrations, the knowledge about the functions and biochemistry of each is growing rapidly.

Nevertheless, we are not yet ready to try living by synthetic diets assembled from the chemical laboratory shelves. We are still relying on Nature's compoundings of nutritional essentials in the foods we eat. That has been the evolutionary route by which human health has come thus far, even while we were using microbes as the scape-goats for "disease" and were oblivious to the exploitation of our soils. Nature's food prescriptions are still defending us against our exploitation of our soils to the extent of their failing to grow the proteins for us and their inability to bring along with those all else that is connected with protein synthesis by plants and animals or with the maintenance of life itself. Now that bad health is being granted more commonly to be a degree of degeneration of the body, the deficiencies in our nutritional support of it, preventable in large measure by ministrations to the soil or starting point in the assembly line of the body's creation, are gradually being catalogued. It is in this direction of preventing bad health, or of assuring good health because we are properly fed, that the soil deserves attention as a major and manageable factor. It is the soil that determines what agriculture grows or produces. Since that industry is given to the production of food, perhaps some closer observations on the soil fertility for its service in plant nutrition, and thereby in nutrition of animals and man, will bring the protein problem into clearer focus for solution. More study of the problem should point to our management of the soil as a means of managing nutrition and health at the same time.

The art of agriculture is old, well-experienced and conservative. The science of it is still young, inexperienced and exploitive. Soil use by the pioneer was a case of return and "turn-over" of its fertility contents when animal power, and manure use thereby, duplicated the natural cycle of use and return of the creative potentials of the soil in place. Modern use of the soil offers little return, when the fertility is removed; when no charges are made for maintenance of that creative capital in place; and when it is flushed into the sea under guise of "sanitary sewage disposal."

In the art of agriculture, then, many of the soil's unknown contributions to good nutrition and good health through the consumption of the food nearer to its origin in time and distance were undergirding us. Many of those services for health cannot now be expected. When proteins are so active chemically, and when they represent nutrition for microbes as well as for us, the increased time and distance between protein production and consumption represent lowered nutritional values in our diets. Nutritional values are lowered at the same time through increased exploitation of the creative potentials for high quality from the soil as the point of its origin. In consequence, our food crops represent a lowering in protein concentration with time, notwithstanding our boast of increasing yields per acre and per man simultaneously.

(To be concluded next issue)

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PART III

(Continued from August issue)

THE decline in protein quality and nutritional quality of feeds and foods is premised in no small measure on the declining supply of nitrogen in the organic matter of the soil and all else active with it. Older experiment fields, like Sanborn Field at the Missouri Agricultural Experiment Station, tell us that under even a six-year rotation with three years of tillage to cereal grains and three grass-legume mixtures, all given six tons of barnyard manure annually, there was a loss of nitrogen from the soil. We have given attention to nitrogen only as an "ash" element. In that procedure we have measured it, multiplied it by 6.25 and have been content to call the result "protein." Yet in the digestion of the very commonly deficient amino acid tryptophane, one-half of its nitrogen content is excreted in chemically unchanged form to represent an error of one hundred percent in measuring the service of this kind of protein in our nutrition.

In that persistent or ever-present error, the mounting protein deficiencies in our agricultural production have continued unnoticed. Animal disasters have also mounted when "crude" protein, chemically measured, has been so deceptive. Plants have delivered less protein. Their seed potential has declined to the point where we mistakenly speak of even the soybean as "a hay crop but not a seed-crop." We have failed to see that the delivery of vegetative bulk as carbohydrate was the maximum the plant could do. It could not procreate its own kind. Yet we erroneously believe such hay to be feed for the cow, and are planning a supposed "grass agriculture" when the grass contains too little protein to make seed for the survival of its own species. The pseudo-science of agriculture flavored with spicy propaganda pleases the economic palate, but it brings on filled bellies and hidden hungers in starving bodies. When experimental soybean plants may make good tonnage of hay but contain less total nitrogen than was in the planted seed, isn't it a crime against the ability of the cow as a connoisseur of her feeds to expect her to be a "hay-baler" when she would have more protein by eating the seeds planted for the production of that hay?

For the production of proteins by plants, the soil must have four dimensions. It must be more than "land," measured by length and breadth. It must add the third dimension i.e. depth, to those two. Then, it must have a fourth dimension, namely, fertility, as a stock of active essential elements representing a plant's diet balanced accurately for all the physiological processes the plant performs. The soil areas providing those nutritional essentials for the plants giving us more nearly complete proteins are very limited. The American bison outlined some of these areas in the mid-continent, also in other scattered areas of our country. So-called "hard" wheat grows in areas of the more western soils which are providing nitrogen for considerable protein production. For the pioneer, the whole wheat bread out there was the "staff of life." Much of our bread now is "a broken staff." Protein concentration in wheat has gone down. Yields per acre of starchy, "soft" wheat have gone up. Corn, grown farther east than wheat, has also been piling up the starch to give bigger yields but even its lesser protein content than that of wheat has gone down too. The use of nitrogen fertilizers does not make this crop give complete proteins, not even enough so for good insect growth, as experimental trials testify. Economically we profit in spite of these biological facts, but nutritionally we are taking a serious loss while making quantity crops in terms of carbohydrates but not quality crops in terms of proteins.

Thus we are slowly learning the soil chemistry, the microbial biochemistry, and the plant's biochemical activities by which the soil fertility determines the food values of the crops we grow and eat. When a seed puts out its root first, and its top second, there is the suggestion that the plant takes to the soil first and to the weather later. It suggests a logical procedure for our thinking first about the soil as a source of nutrition for all life. Shortage of information, and confusion in much of that which we have, has left us concerned about economics and technology of agriculture while forgetting that these are secondary to the biological, creative performances by the soil on which all agriculture, including its economics, depends.

Thus to grow proteins we propagandize legumes. But we give too little attention to the high demands by these plants for a complete array of soil fertility if they are to grow by the proteins which they must synthesize for that result for themselves and their survival before they can pass proteins to the cow or to us. Also, legumes exhaust soils of their fertility faster than non-legumes do. Quality legumes require better soils because they themselves require better nutrition to serve as better nourishment for the animals feeding on them. They take organic compounds from the soil along with the inorganic ones, yet we have given that organic aspect of the soil little or no attention in our emphasis on commercial fertilizers. The growth of the plant's parts above ground has had our attention so completely that we fail to see the soil by which roots must grow first and the tops grow second. It is the soil from which the assembly line of agricultural creation takes off.

The Organic Compounds Synthesized in the Plants More Than the Ash Elements Hitch-Hiking in Them Must Be the Measure of the Soil's Contribution to Quality of Foods.

When the chemical composition of warm blooded bodies, like those of animals and man, are fairly constant, we infer that plant growth is an output also with constant chemical makeup. Viewed as ash analyses for the inorganic elements as percentage of the dry matter, kale with 3.10 percent calcium in contrast to kale with 1.98 percent is but a slight increase of 1.12 percent in the absolute. But relatively, this is an increase of 56 percent. Likewise corn with 10.3 percent protein in contrast to 7.3 is a relative increase over the latter by the former of 40 percent. Then, while we measure each nutrient ash element separately in the final plant, we fail to concern ourselves with the fact that (a) delivery of nutrients from the soil to the plant root must be timed to meet the requirements in the plant's season or schedule of those needs, and (b) delivery must also represent the nutrient elements in the required suites and ratios of amounts to each other for such complex processes like protein production. This delivery in kind and quantity must precede the setting of the seed, if this is to occur. It is in this complex responsibility of the soil to the plant for its nutrition where the controls by the soil of all nutrition along the assembly line of agricultural production is exercised.

The failure of the plants (a) to grow by multiplying their cells, (b) to create the protective proteins by which they are resistant or immune to attacks by fungal and bacterial "diseases," and (c) to multiply themselves abundantly by reproduction, all depend on this struggle for the proteins which is promised on the fertility of the soil. When plant diseases are coming along in more kinds and ways to harass our crop production; and when animal diseases are doing likewise so that we have taken to using the label "x" for diseases as the sign of "the unknown;" shall our minds be closed to the possibility that the bodies are too deficient in proteins to keep from being so little alive that the microbial disposal of an impending carcass or cadavar begins before that body is really dead?

Bioassays, Not Chemical Analyses, Are Required As Measures of Food Quality in Nutrition.

Animals in their desperate struggle for proteins are reporting their troubles in trying to be healthy when they break through from the worn-out soils of our fields to get on the other side of the fence to the highway or the railroad right of way for the forages grown on soils not yet exhausted of their fertility by cropping. Finer discriminations in their feed choices tell us that animals would not choose to be fattened, if they are given an alternative in the form of high-protein, mineral-rich forage in place of only the carbohydrate bulk. The rabbit's selection of the protein-rich germ of cracked corn, rather than the starchy endosperm, and its less rapid gain in weight when allowed to eat mainly germ, indicate the struggle for proteins. Such behaviors tell us that the animals are able connoisseurs in that direction. Unfortunately as feeders we are not consulting, but are compelling, the animals in their nutrition.

But when the fattening of our castrated male farm animals is more of a speculative venture in buying low and selling high than it is a biological exhibition of fuller knowledge about the nutrition of the animal to grow, to be healthy and to exhibit high fecundity in multiplying the offspring to repeat those processes, we must expect degenerative manifestations by our bodies and minds to become more common. Along with that neglect of nutrition for healthy bodies, we must expect to be placing more hope on fighting the microbes and our making more financial contributions to research in drugs, vaccines and hypodermic administrations.

For relief from multiplying miseries, how long must we wait before we turn to ministrations to the body via proper foods put into the intestinal tract with its natural guards of what enters into the bloodstream? Must we not emphasize the natural ingestion of foods grown on the more fertile soils making proteins for plants, animals and man as the recipe for buoyant health?

Animals, like the sheep, whose economic product, wool, is a protein output reflect their struggles for protein when we say "a sick sheep is a dead sheep." It would seem more appropriate to ask ourselves whether we are not having such poorly fed sheep that, under a half-starved life, a little additional shortage in nutrition is merely the final "push-over" into death. When copper deficiency in the soil shows up as irregular wool; when the varied properties of the wool in experiments with trace elements in sheep feeding reflect the differences of these in the soil fertility growing the forage; and when copper sulfate is a vermifuge, would it not be appropriate to raise the question whether the worms are driven out alive (as they are) because they are poisoned or whether they are driven out because of some other results from the copper as it makes up the deficiencies in the sheep's body processes for the creation of those antibiotics which keep the worms out naturally? Animal behaviors are demonstrations of their regular assay for us of food quality according to the soil fertility. But we fail to observe their demonstrations and do not profit for them and ourselves by the data they offer.

When we have so little ability to minister to bodies of man or animals in failing health, or when postmortems do not serve as help to the poor individual contributing the information, isn't it time to believe our aim at health a backward one when we study bodies in the absence of it? Should it not be wiser to use a forward aim in our approach to health by using good nutrition throughout the entire life of a body from preconception forward? Good nutrition needs to be viewed in its closest connection with the soil growing the food with the minimum of losses in its quality between harvest and consumption. Since the proteins and all that is associated with them are highly active chemically and biochemically, their own processes for possible deterioration in nutritional values must be reduced to the minimum. We need to eat our food "close to the soil" that grows it.

In our preservation of foods we aim to have them free from microbes and insects. We aim for them to stay that way a long time. In having foods safe from these lower life forms bringing on food spoilage, we unknowingly emphasize the "long shelf life" or "storage quality" when originally we may have grown or prepared a product too low in protein to tempt even a microbe or insect to try to live by means of it. White flour, which is not inviting to insects, in contrast to the whole grain form of it which is, serves as an excellent illustration.

Those same insects and microbes that might "spoil" the foods, may serve as biological test agents, which is the case of the cricket for example, when by its percentage survival, and its rate of sexual development, along with rate of increase in weight, in laboratory trials give a measure of the proteins in food substances.

If We Are to Survive in Good Health, We Must Manage the Soil So That It Will Grow Our Quality Crops and They in Turn Will Give Us Quality Foods.

When proteins are the life-carrying units, naturally the qualities they provide in that direction can be exhibited and measured more commonly when fed to some living body. Sexual vigor, animal growth and other biological criteria must be used to assess protein quality rather than chemical measures in the laboratory. As a consequence, protein quality cannot be reported on labels. Proof of quality in proteins, like the proof of the pudding, lies in the eating thereof. In ministering to plants in their struggles to grow the more complete proteins for themselves and thereby better nutrition for us, there is as yet no wiser managerial procedure than ministering by way of the more fertile soil. That ministration may well include both the organic and the inorganic parts when growing evidence in the plant's struggle for proteins suggests that we can not expect crop juggling to substitute for both inorganic and organic soil fertility. We must learn how to feed each crop by treating the soil. We are impelled to believe that the basis of future food security is premised on the soil. Our national health, like our national wealth, lies in that natural body and our future in those two respects will depend on how well we manage that resource which must feed all of us.

The Home Orchard

By Alonzo and Elizabeth Leaverton
Skyhook Rancho, Fullerton 16, California

IF you have room for only a few trees in your backyard, the first answer for Southern California is easy—lemon. And it won't make too much difference whether it's Eureka, Lisbon, or Myer. The Myer is under a cloud right now. They say it may harbor a disease. Myer lemons seem to be just a little sweeter than the others. Oh they are sour all right. The sour is just a sweet shade of sour. But it is mighty hard to beat a good tree ripe Eureka. The juice is strong. When you make lemonade you will have to make it dilute. If you try to suck a lemon like prize fighters are supposed to do, it will set your teeth on edge. This can't be described very well so if you can't understand why go ahead and try it.

Never any sugar in our lemonade, of course. Sugar at our place is labeled poison the same as potassium cyanide. Death by cyanide is quick and practically painless whereas death by sugar might take a hundred years of suffering by four or more generations. Even the Orientals with their torture death of a thousand cuts seldom kept the victim alive more than a few months at most. So when it comes to methods of torture, we in the West don't have to be ashamed of our methods, or do we? Take the edge off with honey if you wish. And get your honey out of the package that the bees put it in; a honeycomb. If you really want to live, seek the food Nature can give from fertile seed in fertile land and not from someone's greed stained hand.

A lemon tree sets fruit all year round. And the flavor from a freshly grated lemon rind is hard to equal. The trouble with what we can call commercial lemons is that they are picked for size, not ripeness. Lots of lemons have been chemically smoked with ethylene to get a ripe color. According to gossip this process was discovered in the early days when lemons (or maybe it was oranges) were being shipped across country in a freight car. The car was heated with a kerosene stove, the smoggy fumes from which contained some ethylene. This chemical makes a green lemon (or orange) look ripe. That's the way with many great scientific advances. Somebody just stumbles into them you might say. In the case of the shoe polish dye that goes on lots of citrus fruit, you don't have to do this when you are picking your own. Nor do you need to