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NUTRITION

Soil, Food and Health *

By

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THE TITLE OF THIS ADDRESS may seem out of order for a therapeutic society. Upon reflection, however, we are aware that soil, plants and animals have provided witch doctors and medicine men with

devil-chasing potions, magic brews and more recently physicians with their tinctures, fluid extracts, elixirs, glandular extracts, vitamins and countless other articles listed in the pharmaceutical catalogues for the amelioration or relief of human suffering.

Fertile soils, healthy plants and healthy animals constitute our most potent therapeutic apparatus for the maintenance of health and the prevention of most diseases afflicting the human organism. This is a

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fact which most physicians and scientists have been tardy to appreciate or recognize. Man's health depends more upon healthy soils, plants and animals than upon miracle drugs and "Fountain of Youth" serums. As therapists, our concern should be more with the prevention of physiobiologic wreckage than with the end results of improper nutrition and improvident living. We should realize that public health is no longer a matter of Federal, State and Municipal appropriations of huge sums of money for therapeutic facilities available to everyone. Health can be purchased in a well organized food culture — it cannot be purchased as a commodity in hospitals, clinics or custodial institutions. In the last analysis physicians, hospitals and other medical service institutions are in the business of treating sickness. Until we overcome our distorted therapeutic habituations and cease to think of health in terms of remedial measures for sick people, our health programs shall be farcical.

For centuries we physicians have been breathing the miasmatic odor of biologic decay in the dismal swamp of pathology. We are more proficient in the detection of biologic decay than we are in the recognition of biologic health. In other words we are like the institutional psychiatrist who rarely contacts a normal person and when he does, he at once attempts to distort normality into abnormality. When we emancipate our minds from the therapeutic aspects of pathology, enlarge our etiologic horizon beyond the boundaries of Pasteurian pastures populated with microorganisms which we have blamed for most of mankind's miseries and become concerned with where good or bad food and animals are grown, then we shall begin to realize that Nature has provided us with an ecologic pattern that is self-sufficient for the survival of all species.

Unfortunately, with the development of what we call brains, we have progressively disturbed, distorted and frustrated the ecologic provisions of Nature and we are now paying for it in terms of more hospitals, clinics, custodian institutions, penal institutions and a misdirected social apparatus which baffles our best minds in respect to the future of mankind.

II

Soil is the product of rock weathering, soil material accumulation and a "plant-climate" environment which provides and incorporates organic materials and biologic life in the surface soils. The soil must teem with chemical and biologic activity. It is from this kind of a soil that new plant life emerges to provide us with the many organic substances necessary for animal life.

To really appreciate the genetic origin and development of soil one must think of its accruing in stages or steps. Of primary importance is the metamorphosis of geological rock materials into *soil materials* — *not soils*. The soil material is exposed to and endures many different kinds of environment which are climatic (temperature, moisture, drainage) as well as the biologic activity of microorganisms, earthworms,

insects and fungi. After these factors have contributed their effects, then, and only then, do we have soil. Soils vary greatly in their regional characteristics even though the parent geological material may be almost identical. For an exhaustive discussion of this subject one should review Dr. Marbut's "Atlas of American Agriculture — Part III, Soils of the United States," or Milton Whiney's "Soils and Civilization."

Nutritionists and soil chemists agree that proper nutrition and the role that it plays in the maintenance of good health involves twelve factors:

1. The ecologic equilibrium of the fauna and flora of the soil.
2. Fertility of the soil.
3. The vigor of the germ plasm of the seed.
4. Climatic factors — temperature, moisture, sunshine.
5. The proper culture of the flora and fauna which supply man with food.
6. The harvesting and storage of food.
7. The handling of food during transportation and distribution.
8. The methods of processing through which food has gone — milling, canning, brining, salting, dehydration, freezing, sun-drying, curing and smoking, sulfuring, dyeing, etc.
9. The intelligent selection of food at the market.
10. The proper preparation of food either for immediate consumption in the raw state or for cooking.
11. Proper methods for cooking different kinds of food.
12. The proper care of left over food to be used at subsequent meals.

Many of our most fertile areas are geologic happenstances. Other factors are involved, and I shall review some of the most important of these.

Fertile soils are live soils, populated by countless numbers of bacteria, fungi, molds, yeasts earthworms and insects. Bacteria, fungi, molds and yeasts are important because they manufacture and excrete enzymes which control the digestive processes of the soil. The more fertile the soil, the more biologic life it contains. At the Rothamstead Agricultural Station in England bacterial counts per gram of soil decreased from 28,860,000 on soils fertilized with farm-yard manure to 15,100,000 on soils treated with artificial fertilizers. It was noted that poison sprays caused a serious reduction in the soil's micro-flora.

If left alone, Nature supplies a wide range of fertilizer materials at no expense — we have only to take advantage of the natural cycle of growth, decay and return. In fertile soils it is estimated that the number of bacteria in an acre may weigh as high as

600 pounds. When they die, their bodies undergo decay — being split up by enzymes and other forms of microbial life into simple elements which are returned to the soil. These tiny organisms, because of their prodigious growth under favorable circumstances, are effective helpers in maintaining soil fertility.

The lowly earthworm, with a life span of not more than a year or two, was considered fish-bait until Darwin studied its function in soil. It is estimated that the weight of dead earthworms in fertile soils may amount to over 500 pounds per acre. What a fertile source of protein and mineral matter for plant nutrition! Microbes break down these compounds and make them available to plant roots.

The earth teems with other forms of organic life — ants, beetles, spiders, rodents, to mention a few — Darwin estimated that the excretal matter from earthworms, insects and rodents was some ten tons per acre. More recent studies estimate it at about twenty-five tons. The Connecticut Agricultural Experimental Station found that earthworm castings were rich sources of nitrogen, phosphorus, potash, and magnesium. In comparison with the top soil, the castings contained five times as much nitrogen, seven times as much phosphorus, eleven times as much potash and three times as much **magnesium**.

Dead roots of old plants are also a rich source of organic matter. A two year crop of red clover supplies about three tons of dead roots per acre which contains about 180 pounds of nitrogen, seventy-one pounds of phosphorus and seventy-seven pounds of potash. Roots decay rapidly and the spaces which they occupied remain channels to aerate and irrigate the subsoil. Above ground residues of crops may contribute one to three tons of additional fertilizer per acre.

Rain washes into the soil about forty pounds of sulphur per acre per year. It also washes atmospheric dust, teeming with microbes, carbon and some lime into the soil to contribute more to its fertility. Even snow, which has been termed the "poor man's manure" has affinity for phosphoric compounds and is rich in nitrogen.

The subsoil rocks constantly undergo weathering to form new soil to offset the erosion of the surface soil. The loose rocks near the surface are valuable as fertilizer material, providing aeration and warmth for the plants growing in the topsoil.

Plants obtain only about five per cent of their nourishment from the soil. The other 95 per cent of their nourishment is obtained from the air, the sunshine and the water. Dr. Chlorophyll, the master chemist, traps the sun's energy, collects a few elements from the air and the soil, combines these with water and then plants fabricate the nutritional essentials for the growth of bacteria, fungi, earthworms, insects, reptiles, fowls, fish, animal and man. Directly or indirectly all life comes from the soil and we who live upon its surface should take a lesson from the

earthworm — to use nutrient material for the synthetic processes which keep life going for the life span of the species, to deposit our excretal wastes in the topsoil and return our carcasses to the soil for re-use in the endless cycle of growth, decay and return.

III

It is the consensus among foremost thinkers that we must revise, reimplement and frequently reverse the direction of trends in our politics, husbandries, economy and culture. Since the problem of nutrition encompasses the Wheel of Life, then a revolution in nutrition could and will profoundly influence every aspect of our way of life.

Before we start this overdue revolution in nutrition, let us examine briefly what has occurred in one sector of our food culture to make this revolution desirable.

As you all know, the pioneers were not interested in the maintenance of soil fertility or the conservation of their soils. The customary procedure was to move into a section where Nature's Wheel of Life had been turning undisturbed for centuries, destroy forests wantonly, grow as many successive crops as possible before the soil became exhausted of its natural fertility, kill or trap game for the sport of it, and then to construct a flatboat and float downstream to settle and rape another fertile section of land. To a great degree, this profligate behavior was responsible for the western expansion of the pioneers. After the pioneer period the signal success of intelligent agricultural practices in the very deep South was noted and people gradually became rooted to the ground upon which they were born. A gradual transition in farming methods took place due to an increased demand for livestock and farm products, to insufficient and inefficient manpower, and to the necessity for maintaining the productivity of the soil. In response to the urgency of these factors, scientific and inventive minds began to develop technologic methods and machines which, within the past seventy-five years with the aid of the profit incentive and the help of a poorly disciplined embryonic advertising business, have succeeded in changing our food culture and economy.

Let us examine these changes and ask ourselves whether these practices have been beneficial or harmful.

Grains and cereals are our most abundant and predominant source of foods. In the pre-combine days, wheat was allowed to mature on the stalk. It was reaped by hand and shocked, threshed and sun-dried to reduce the moisture content so that spoilage while in storage would be minimized. Today the reaping and threshing of wheat is one operation and the moisture-laden grain is hauled to a storage bin where cyan gas is forced into the bins to protect the grain against the ravages of rodents, weevils, and other pests until it is milled between steel rollers, and bolted (literally filtered) through cloths of various gauges to separate

the component elements of the wheat berry into five commercial products. The flour is then treated with "agene" to improve its baking and keeping qualities. This chemical produces convulsions in dogs and other animals. Its effect upon humans is probably harmful; what will poison a dog will poison a human.

In 1840, one ounce of genuine unspoiled whole wheat bread made of whole stoneground wheat (not flour) contained 30 units of vitamin B₁. One hundred years later one ounce of white bread contained not 30, but FIVE units of vitamin B₁. Seven hundred units of vitamin B₁ per day are considered necessary for the maintenance of good health. The daily consumption of 40 ounces of whole wheat bread in 1840 assured 1,200 units of natural vitamin B₁ — while our average daily intake today assures only 200 units, mostly synthetic. Besides being robbed of vitamin B₁ the wheat berry is robbed of other known and unknown dietary factors — proteins, other important fractions of the vitamin B complex, vitamin E and a number of essential minerals. To produce commercial white flour, the removal of these essential nutrient factors is considered necessary in order to decrease spoilage and to produce profits. White flour is sold to the bread or bakery industries; part of the bran finds its way to the laxative-factories; part of the gluten is sold to the gluten-bread factories for consumption by diabetics; middlings are processed by the breakfast food and cereal factories to give the gullible their quota of morning "pep"; part of the wheat germ and wheat germ oil finds its way to the drug factories to be processed for pharmaceutical distribution where childless couples are urged to purchase it to restore their sex fertility — and most of this would be unnecessary if we ate foods as produced by nature. What is left of the wheat berry is then sold for livestock food. Other grains and cereals, including polished rice, are subjected to similar processing.

The consumers of bread and bakery products made from the bolted flours of grains and cereals have been assured that they need not worry because the wise food chemists have "enriched" these non-nutritious flours with a few synthetic vitamins and inorganic minerals. This assurance, in the form of widespread propaganda, is made in the face of contradictory evidence adduced by investigators having no direct or indirect vested interest in the manufacture or sale of synthetic vitamins or inorganic minerals.

Briefly summarized, the steel roller mill, mono-crop agriculture, failure to conserve the soil or replenish it with humus, the combine, cyano gas treatment, separation of grains and cereals into several fractions which are used and sold separately, the centralization of the milling industry in certain sections, the development of the baking industry, etc., have dangerously altered our food economy and culture with respect to breadstuffs. Sadly enough, instead of the consumer receiving nutritious bread products at a cheaper price he buys a starch product of dubious and unproven nutritive value which has to be en-

riched before it is considered fit to eat, and pays an exorbitant price for it.

As previously stated, 12 factors are involved between the field and the table to determine whether or not our nutrition shall be adequate or inadequate. Food should be judged on a quality rather than a quantity basis. Unfortunately few standards exist for informing the consumer as to the quality of the food produced. In view of the fact that the quality of our food involves so many factors, mostly disadvantageous ones, legislation is in order to enforce proper labeling and grading of all foods sold to the consumer. Date labels are greatly needed for all tinned and packaged foods. We as physicians should become active participants in urging the framing of a pure food and drug law which would be a positive agency in protecting the consumer. Also we should become interested in such vital problems as soil and water conservation, in fertility replenishment of soils with humus and fertilizer material processed from urban garbage, street sweepings and sewage, and in the climatic factors which so largely determine the biologic quality of our food supply.

The excellent work being done in England by Sir Albert Howard, Sir Robert McCarrison and the Panel Doctors of the County of Cheshire, and in this country by agricultural experimental stations in practically every state of the Union under the direction of Prof. L. A. Maynard and associates, Cornell University, Ithaca, N. Y., and by Professors W. A. Albrecht and Samuel Brody, University of Missouri, Columbia, Mo., has established a one to one correlation between healthy soils and healthy plants and of both to healthy animals and humans.

IV

Since the beginning of time mankind has been bedeviled by the problem of an adequate food supply. This uncertainty of his food supply was caused largely by unpredictable events over which he had no control. The process which we now know as civilization possibly resulted more from man's unremitting effort to secure for himself an adequate food supply than from any other single factor.

The part played by food in the maintenance of good health and in the prevention of epidemic plagues has long been known to the public. Those of us acquainted with the history of the development of the science of nutrition are at a loss to explain why it has taken so long for physicians to establish an "eye to eye" correlation between the relation of food to the health of animal and man. In the past only in isolated instances did physicians drop their medicine bags long enough to question the relation of faulty or deficient food to the physical ailments that they were treating. Even now, despite the numerous positive findings of nutritional research, the rank and file of physicians and dentists ignore the enormous therapeutic potential which is inherent in foods of good biologic value.

What food processing is doing to our national health was shown recently by a large-scale experiment. At the beginning of World War II someone in the Surgeon General's Office probably unfamiliar with the physical manifestations of malnutrition, drew up a list of physical specifications for use by the draft examiners. The rejection rate of the first two million selectees soared to a startling figure and a lower standard of physical fitness was formulated. Even so, draft rejection rates in World War II were approximately 14 per cent higher than those of World War I. These are cold figures that demand an answer and action from us as guardians of the nation's health. I do not think that this unfitness of our youth can be ascribed to a more universally potent factor than the increased consumption of highly processed foods which spiraled upward between 1918 and 1941.

All of you recall, I am sure, the economic debacle which occurred shortly after World War I and the familiar bread-lines, PWA projects, food stamps and other agencies of expediency which were resorted to in an effort to forestall widespread famine in this land of plenty. However, our food culture by this time had been so critically disturbed by the food industry, chiefly by the milling, baking, pie and cake making units, and by the sugar, candy, and sweet beverage manufacturers, that literally we fed the thousands of people on relief with cake and candy!

Paralleling this rise in malnutrition, of which most physicians were unfamiliar, we have seen a concerted drive for more hospitals, clinics, custodial institutions and for universal distribution of free medical care. These drives are masqueraded under the guise of health-promoting programs.

What are the factors responsible for this deplorable change in our food culture? The undermining of

our national health began with the pioneers' practice of acquiring land, exhausting it and then abandoning it to the forces of erosion, etc. Later came the McCormick reaper, the steel roller mill and other processing innovations which were to become the foundation for many corporate units of the food industry. This centralization of the food industry, plus mass production, licked the small food merchant who had been selling locally produced, less processed foods than those now sold by grocers. The medical and dental professions failed to oppose the wholesale adulteration of our food supply, thereby allowing the insidious extension into our food culture of processed foods whose nutritional value was never questioned, until after the damage was done.

Conditioned food habits based upon biologically irrelevant traditions, prejudices, fashions, prestige symbolisms and advertising slogans or programs unfortunately govern most of us in our choice of food.

How can the medical and allied professions become effective in combating the serious effects of malnutrition on public health?

1. We should interest ourselves in the soil; its fertility, its replenishment and conservation.
2. The problem of water conservation is also an important one.
3. We should educate our patients to insist upon buying natural foods rich in nutritive essentials, and to refuse to buy highly processed food commodities low in nutritive content. As a group, we could be instrumental in promoting an effective consumer boycott of these foods.

In the last analysis, food of good biologic value is the best therapeutic agent we possess. To this end this sketchy address was prepared.

Nutrition Notes

Mixed Insulin

There is some advantage, in certain cases of diabetes mellitus, of giving regular and protamine-zinc insulin mixed in the same syringe. Such mixtures produce effects appreciably different from those obtained by similar doses given as separate injections at different sites. Some preparations of PZ insulin contain an excess of protamine, and when any regular insulin is added, it will be altered, if not exactly to protamine-zinc insulin, to a compound which has a delayed action. Roughly, one unit of PZ insulin can adsorb and change one-half unit of soluble insulin. Each patient has to be considered individually and a combination found which works on his or her particular case. The regular insulin should be drawn into the syringe first and secondly the PZ insulin drawn into the the same syringe, and the syringe rolled in the fingers to assist mixture prior to injection. Such

a method of treatment can be made to obviate nocturnal hypoglycemia, and usually only one injection daily is needed.*

Diet and Infection of the Eyelids

The time-honored methods of treating styes are not always successful and there is now some evidence to indicate that a poor diet, especially one which is inadequate in proteins, has much to do with predisposing to the infection and an adequate protein intake is essential in curing it. Unpublished reports on children living on the islands off North Carolina show an extremely high incidence of marginal blepharitis and styes and these children live on highly refined starches and grains with very little protein of animal

* Downie, E.: Observations on the use of mixtures of protamine zinc and regular insulins in the management of diabetes mellitus. *Med. J. Australia*, April 3, 1948, Vol. 35, No. 14, 425-429).