

RACE BETTERMENT THROUGH PREVENTIVE DENTISTRY

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222

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MODERN civilization is in a dilemma. The biggest problem in the world today is not war, but means for race betterment. Epidemics, plagues and infectious diseases are largely under control. Today, the members of the healing professions are engaged in alleviating suffering from degenerative diseases by means of remedial surgery and makeshift repairs.

A prime requisite is a new orientation; first, for recognizing our dilemmas, and second for establishing educational programs and leadership for human conservation through race betterment. As an aid to this new orientation, let us note the observations of some of our leaders in social sciences.

1. Modern man is delicate. . . . The organism seems to have become more susceptible to degenerative diseases. (Carrel.)

2. Nearly one-third of the whole population (of two dozen states) is of a type to require some supervision. (Laird.)

3. Of 2,000,000 babies to be born in 1941, 738,386 will be wholly or partially wasted, 37%. (Nat'l Committee for Planned Parenthood.)

4. Measurable brain can be correlated with testable mind. (Waverly Researches.) 5. Thinking is as biologic as digestion. (Thorndike.)

6. Of all the psychological causes of crime, the commonest and gravest is usually alleged to be a defective mind. . . (Burt.)

7. . . Gross human congenital malformations arise solely from influences which affect the germ cells prior to fertilization. . . . (Murphy.)

8. Èggs (fertilized ova) are not all of equal quality, 25% are not good enough to be born as living individuals. (Streeter.)

9. It is store food which has given us store teeth. (Hooton.)

Jour. A.D.A., Vol. 29, February 1942

10. There is a nutritional basis for modern physical, mental and moral degeneration. (Price.)

These quotations are from the textbook "Nutrition and Physical Degeneration: A Comparison of Primitive and Modern Diets and Their Effects."

Evidence of our modern degeneration is developing at an increasing rate and has now reached a point where the continued existence of modern civilization is threatened. This is well illustrated in the alarming death rate from several modern degenerative diseases. The report of the Metropolitan Life Insurance Company under date of August 1941 reveals that death rates per hundred thousand policy holders had reached, for the month of July 1941, 714 for all causes. Of these, 185 were from heart disease and arterial conditions and 100 from cancer, death rates from all other causes combined being 429. Whereas, formerly, infectious diseases accounted for the large proportion of deaths, these are now well under control, but the degenerative diseases have increased to such an alarming extent that in this total of 714 deaths for the month of July for each hundred thousand policyholders, the degenerative diseases now constitute 420, or 60 per cent, of the total. Of the degenerative diseases, conditions of the heart and arteries and cancer took 285, or 40 per cent; while all of the other causes took only 293, or 40 per cent. The latter number included automobile accidents. Even this wastage of human life is not adequately expressed by a consideration of the principal causes of death after birth; since of every hundred pregnancies in the United States, twenty-

The Journal of the American Dental Association

five are reported to end before term. In order that we may get a bird's-eye view of simply one factor in progressive modern degeneration, let us consider the problem of depletion of soils. In Figure 1, we see expressed diagrammatically the ratio of the various minerals that make up the soil of the earth from which all our plant foods must develop. It is of interest that calcium and phosphorus are limited to the small section at the left of the circle. Calcium and phosphorus, in the group of minerals classed as apatite, constitute only a minute percentage of the earth's surface. These two minerals, we must realize that the top 7 inches of an acre of ground eontains only about 1,000 pounds of phosphorus in a chemical form in which plants can use it. Now when we realize that a 60-bushel crop per acre of wheat or corn will remove from the soil about 25 pounds of phosphorus per acre, or one-fortieth of the total content of the top 7 inches, we are immediately confronted with the fundamental, controlling problem that we have, accordingly, only enough phosphorus in the average soil for forty excellent crops. This is why we see so many farms that have been abandoned



Soil Minerals as Provided by the Original Source, the Igneous Rocks. Figure 1.

forming as they do the principal constituents of bone, are in greatest demand in the growth of animal life.

It will aid us in visualizing the difficulties involved in obtaining these minerals by plants and animals to observe with regard to phosphorus that it constitutes only about one part in 1,000 of the earth's crust. Plants, dry weight, require about 30 parts per thousand; while animals with skeletons, dry weight, require it in the ratio of 100 parts in 1,000. The only source of phosphorus is the soil on which the plants grow, and because they have been exhausted of their minerals, particularly phosphorus. It is also the reason that the annual death rates are so rapidly increasing in certain parts of the country, particularly those districts that have been longest settled or where the soil is shallowest.

While it is true that only about onethousandth of the original earth's surface consists of available phosphorus, Nature's system of management of plant and animal life provides for an accumulation of the minerals most used by increasing the concentration of these

PRICE—RACE BETTERMENT THROUGH PREVENTIVE DENTISTRY

minerals on the surface of the soil. In Nature's program, plants and animals return to the earth what they borrow. The roots of plants, large and small, particularly forests, bring up the required minerals from the various depths to which the roots penetrate and deposit them as fallen leaves and trunks, to decay on the surface. By this method, Nature builds an enriched top soil, production of one inch of which requires 400 years. Our prairies have from 4,000 to 10,000 years of accumulated top soil, which greatly reinforces the capacity of the surface for plant growth. The top soil is normally held by the roots of grasses and shrubs. When the roots are all removed, the wind and water rapidly carry away top soil, chiefly to the ocean, where it is lost for human use.



Fig. 2.—Cattle that died because pasture was so poor that it could not sustain life.

The death rate from heart disease in 1925 as reported by the American Heart Association has for many areas increased 50 per cent or more, in the last fifteen years. The states of New England and those bordering the Great Lakes, together with the Pacific coast states, constitute the areas where the death rates are the highest, and these are the areas that have been occupied for the longest time. Large areas of these states now have a greatly reduced capacity for human maintenance, requiring that food be shipped in from other areas.

My studies of this problem of reduced capacity of soils for maintaining animal life have included correspondence with the agricultural departments of all of the states of the union with regard to maintaining cattle. The reduction in capacity ranges from 20 to 90 per cent, and large areas are reported to carry successfully now only 50 per cent as many head of cattle as formerly. I am advised that it would cost \$50 an acre to replace the phosphorus alone that has been shipped off the land in large areas.

There is an important fact that we should consider; namely, the rôle that has been played by glaciers in grinding up and distributing rock formations. One glacier, the movement of which affected the surface soil of Ohio, covered only about half the state; namely, that area west of a line starting east of Cleveland and extending diagonally across the state



Fig. 3.—Steer with long horns sagging because of demineralization after animal was removed from good pasture to poor one.

to Cincinnati. It is important for us to note that, in the areas south and east of this line, several expressions of degeneration are higher than in the areas north and west of this line. The infant mortality per thousand live births in 1939 is very informative. In the counties north and west of that line, the death rate was from 40 to 49 per thousand live births; whereas, in the area south and east of that line, the death rate was from 50 to 87.

It is of particular interest to us as dentists that studies show the percentage of teeth with caries to be much higher

The Journal of the American Dental Association

southeast of this line than northwest of it.

The effect of depletion of soils on animal life is striking. In a district in which I was studying this phase of the problem, I examined ranch cattle that were pasturing on a badly depleted soil where there was adequate water. These cattle had been shipped into the area to provide food for human beings. In one district, in traveling about 5 miles, I counted ten head of cattle that had starved to death for certain minerals that had been depleted from the soil. A typical example is shown in Figure 3.

Another excellent illustration of the effect of change of pasturage on cattle is shown in Figure 3. A number of wellfed long horn cattle were transferred from a good district to a poor one. Figure 3 shows two views of the same steer, at the left while pasturing on a good soil



Fig. 4.—Residue of bread (left) of sufficient nutriment that one-half slice supported bugs skeletons of which are shown at right.

and at the right after being transferred to pasture on a depleted soil, indicating the results of depletion of the soil of minerals. Because the long rangy horns have been demineralized at their base, they have dropped down so that their tips extend far below the nose and mouth. This condition constituted a barrier to eating grass because the horns prevented the animal from reaching its food. In the picture to the right, the steer is badly emaciated.

Another approach to this important problem is directly related to the quantity of animal life, large and small, that can be maintained on grain food such as flour. This is of special concern because of the effect of depletion of our cereal foods of natural minerals and vitamins. Modern white flour has had approximately four-fifths of the phosphorus and nearly all of the vitamins removed, in order to produce a flour that can be shipped without becoming infested with insect life. I have been advised by millers that they could not ship flour if the minerals and vitamins were not removed. At once, we have an important measure of the value of a food; namely, the quantity of insect life that it can support. The more valuable the product for human food, the more insect life it will support. Whereas highly refined white flour will support almost no insect life, a good product will support a relatively large amount of insect life in proportion to the volume of flour.



Fig. 5.—Best preserved Neanderthal skull; illustrating standards of physical excellence provided by skulls of ancient races of man.

When I was studying this problem in the high Alps in Switzerland, I found an excellent state of physical development and health in adults and children living in all the high valleys. While the summers were short, the rate of plant growth was rapid, and rye was the only cereal that developed well for human food. Herds of cattle pastured near the glaciers. Mountaineer cabins were located near the foot of the glaciers. The children living in these cabins were exceptionally healthy. On the side of the valleys, rye was grown for bread. I obtained a piece of the bread that was made in one of these homes and put it in a bottle and carried it with other foods to my labora-

PRICE—RACE BETTERMENT THROUGH PREVENTIVE DENTISTRY

tory for chemical analysis. It was rich in minerals and vitamins.

In Figure 4, the dish to the left contains all of the residue of that bread after it had been eaten by the bugs which later developed in it. The one at the right shows the quantity of skeletons of bugs that had developed in and lived upon this one small piece of bread. This explained why the human life living upon it was so exceptionally fine. Bugs and children require the same minerals and vitamins. Our modern white bread cannot support much insect life.

This is one of the evils that has accompanied our progress in moderniza-



Fig. 6.—Ancient cave man who saw stars that modern man can see only through telescope.

tion. We do not realize how much modern human beings are handicapped and injured since they learned how to modify Nature's foods. The wild animal uses Nature's foods as Nature makes them. This was true of the earlier races of mankind. In proportion as man has learned to modify Nature's foods, he has degenerated.

The physical qualities of the Neanderthal man as he inhabited southern Europe are attested by the perfection of his skeleton. In Figure 5, Prof. Sergio Sergi, of Rome University, is shown with what is called the most perfect Neanderthal skull. I visited him in Rome and studied his wonderful collection in 1935. Whereas only four skulls out of 4,000 belonging to the pre-Christian era and gathered from Italy and surroundings islands showed serious malformations, approximately 40 per cent of the skulls in the collection of people who died in the last fifty years showed gross imperfections and abnormal formations. These people had all died in mental institutions.

217

I have been impressed many times in



Fig. 7.—Ancient Maori skull, illustrating physical excellence provided by obedience to Nature's laws.

my studies with the superior physical development and acuteness of the senses of primitive races. This is strikingly illustrated in the visual acuity of the Maori of New Zealand, the Aborigines of Australia and some African tribes. Figure 6 shows a caveman. He did not need a telescope to correctly draw the position of the stars constituting the constellation of Pleiades. Note the accompanying text:

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

Delighted were archeologists to discover a prehistoric cave-wall painting of the Pleiades star group "Seven Sisters." But surprised were they that the ancient artist painted ten stars, four of which we need telescopes to see. Natural guess: stars were brighter then. Astronomers said "No"—the artist had seen all ten stars with his naked eye. Correct assumption: cave men had better eyesight than modern men.

I was advised that the Australian Aborigines could see a mile away animals which the white man could not see.

It has been my privilege to study the skeletal remains of primitive groups in many parts of the world. I have been continually impressed with the superior qualities exhibited, particularly skull development and design of dental arches.



Fig. 8.—Ancient American husband and wife who lived where food was deficient. His skeleton and teeth are much better than hers. The food was not good enough to protect her against overloads.

Among the skulls of the Maoris of New Zealand, of individuals who lived before the coming of the white man, only one tooth per thousand teeth had been attacked by decay. This is in striking contrast with the condition of the teeth of this same people today since it has become largely modernized by contact with the white population. In my studies of modernized Maori groups, I found from 300 to 600 per thousand teeth attacked by dental caries. This is a typical and striking illustration of modern degeneration. The whites of New Zealand, according to their own dentists, have the

poorest teeth in the world today. A typical primitive Maori skull, Figure 7, shows excellent dental arches.

I have recently made a study of pre-Columbian Indian burials in seven of the southeastern states. It has been impressive to see that those groups that lived near the coast and used sea animal-life abundantly, as evidenced from the material found in the burials, had excellent skeletal development, usually with complete freedom from dental caries. This was also true of skeletal material in the interior districts where they used freshwater clams liberally. In contrast with this, in those areas where they were largely dependent on plant foods and small animals, the skeletal material was fragile and tooth decay often had been extensive. A striking difference in skeletal quality was found. Whereas the skeletons of both men and women were in a state of complete preservation and physical perfection, with little or no caries where sea foods were eaten, those in the interior districts showed a marked difference in quality of the skeletons of adult women and adult men. This is illustrated in Figure 8, which shows what is presumed to be a husband and wife buried together. While his skeleton is well preserved and its structure excellent, most of her teeth had been lost and her bones were of much poorer structure. This may have been due to the overload of pregnancies. This condition did not occur where sea foods were used liberally.

There is a marked tendency in modern civilization to substitute synthetic products for Nature's foods. This has been particularly true of vitamins. While these tendencies are fortunate so far as Nature's requirements can be duplicated, the limited knowledge regarding the number and kind of activators and their individual rôles in conjunction with other necessary activating substances and body building minerals has resulted in serious injuries and some unfortunate misappre-

hensions. For example, it has been assumed that so-called vitamin D as viosterol included much that is required for the control of mineral utilization, particularly calcium and phosphorus.

Since the reduction in skeletal growth constituted the most easily observed deficiency in nutritional interference in infancy as expressed in rickets, the growth process was assumed to ade-quately express Nature's requirements for mineral utilization. It was early found that exposure of affected infants to ultraviolet light, either from sunlight. or from an artificial source, and the use of materials that had been exposed to suitable radiant energy were comparable procedures, since both were effective in preventing rickets. Thus, the activation by irradiation of ergosterol marketed as viosterol or calciferol was supposed to accomplish all that was needed for reinforcing the body enough to maintain normal mineral utilization. A patent was granted covering the entire process of activating drugs and food substances by irradiation. Notwithstanding the fact that I was one of the first, by some considered the first, to report this process, I have never interpreted my data as indicating that irradiation of ergosterol satisfies Nature's requirements. In the first volume of my work on "Dental Infec-tions, Oral and Systemic," published in 1923, page 342, I presented a preliminary report, in a chapter on irradiation. Later, in a paper read before the National Academy of Sciences at Washington, April 27, 1926, I presented further data on the effect of irradiation including the activation of cholesterol by this means.1

For nearly two decades, the product activated ergosterol has been accepted as meeting Nature's requirements for mineralization as expressed by a need for vitamin D. Recent studies, however, have shown that Nature's product is not activated ergosterol, now known as vitamin D_3 , but activated cholesterol, now known as vitamin D₃. During the years in which activated ergosterol has been used extensively to aid in mineral utilization, many clinical reports have indicated marked inadequacy as expressed by clinical results. Dr. Brehm,2 for example, has reported that a very large percentage of infants born to mothers that had received activated ergosterol and minerals in tablet form during the gestation period were abnormal at birth, showing such conditions as stone in the kidney and abnormal closure of the sutures of the skull and the fontanel at birth. Calcified islands were also found in the placentae. Several reports have appeared of infants dying soon after birth with gross calcification, including involvement of the coronary artery and myocardium and arteries of other parts of the body.

With the newer knowledge of the determining rôle of nutrition in the development of degenerative diseases, which, according to the data previously quoted, now cause 60 per cent of deaths, it is evident that, in many cases, conditions which do not cause death are primarily vitamin deficiency, including dental caries. The new rôle of nutritional control for disease prevention challenges the attention of the various groups engaged in public health service. Almost weekly, reports appear of additional findings throwing light on the contributing factors in heretofore obscure nutritional diseases.

An important illustration is a report in *Science News Letter* for August 2, 1941, presented under "Medicine" with the following headline: "Cancer Growth Prevented in Mice by Yeast and Vitamins; Vitamins Alone Had Little Effect, but Riboflavin and Pantothenic Acid with Yeast Succeeded with 62%."

These advances in knowledge emphasize the necessity that a change be made from relief of the symptoms of these degenerative diseases by surgery and repair to measures that are adequately conceived and applied for their preven-

tion. While I am not suggesting that a cure for malignancy has been found, data available from several sources indicate that this and other serious disturbances of the digestive tract and associated organs are directly related to nutritional deficiency. In my contacts with government hospitals and medical missions that had been established among primitive races, these diseases were reported to be rarely found among the strictly primitive groups, but to be found in the same stock after they were modernized. Two things are strongly emphasized: the imperative need for substituting prevention for repair, and the need for programs for teaching the public regarding means for prevention.

This at once raises an important question: By what means will the public be informed and who will be their teachers? A report of the survey of the American Dietetic Association made of schools teaching nutrition indicates that of seventy-six medical schools reporting, only twenty had separate courses on nutrition, and of thirty-nine dental schools reporting, only fifteen had separate courses on nutrition. This survey was made in 1939. On this basis, it would seem that we have an explanation for much of the confusion in the minds of the members of the dental and medical professions in this matter of preventive medicine, including dentistry, through nutritional means. There are many reasons why the dentist is the logical person to accept responsibility for the education of the public. He is in a position to see the need, since one of the almost universal maladies of modern man resulting from inadequate nutrition is expressed by dental caries, and because he sees or should see nearly all of the population, beginning in early life.

Dental caries and periodontal disease are expressions of faulty nutrition. Another large group of disturbances will be seen by the dentist if his knowledge includes essential information concerning the need for prevention of prenatal injuries which result from inadequate nutrition of the germ cells of the parents. The latter includes a correct conception of the origin of such deformities as crooked teeth, malformed faces and dental arches and mouth breathing and the significance of brain defects causing abnormal behavior and reduced mental capacity from defects of the parental germ cells. I have reported on this in detail in "Nutrition and Physical Degeneration."

One of the most serious of the present confusions is failure to appreciate that an adequate, well-balanced diet is capable of building people strong and well in all respects and adequate for maintaining health and strength. This is the right of all mankind and their sacred birthright. The primitive races have demonstrated a score of different nutritional formulas, any and all of which will accomplish this. These, when reduced to their bases, are chemically equivalent. The primitives' methods of living give them excellent appetites, enabling them to provide a good factor of safety for the essential minerals and vitamins. While they do not understand the chemical nature of the needed foods, they know and teach the use of the special foods that are needed for providing normal development and continuous health of the various organs and tissues of the body. The Chinese, for example, in a treatise written 1,600 years ago, listed more than sixty foods that were good for eyes, more than twenty of which we now know to be very high in vitamin A, an essential for both the development and the function of the eyes.

The general excuse that the dentist makes is that he is too busy to concern himself with the study of nutritional programs; but this does not answer humanity's needs. The abundance of data available indicating the superiority of the natural foods over modern processed foods compels consideration in human-

PRICE-RACE BETTERMENT THROUGH PREVENTIVE DENTISTRY

ity's behalf that a broader conception of the responsibility of the dentist be accepted.

In the light of this bird's-eye view of modern problems, we find modern civilization condemned to progressive degeneration and final extinction unless means are found for its regeneration through a return to adequate nutritional programs. It is acknowledged that the dentistry of the last hundred years has added almost nothing to the prevention of dental caries and this notwithstanding the fact that the dental branch of the general health service seems clearly to have had the responsibility for leadership in preventive dentistry.

The dentist concerned with prevention will, in his lifetime, receive compensations never experienced by those dentists concerned primarily regarding their opportunity to profit through hu-manity's misfortune. Only he can know the gratitude of individuals for freedom from pain, incapacity and mutilation for themselves and particularly for their children. He will have the realization that he has made the world a better place to be born in and to live in and has had the opportunity of making himself so nearly indispensable to the welfare of his community that the public will safeguard him from all danger of regimentation. He will have an opportunity to be Nature's helpmate in rescuing degenerating modern civilization, otherwise doomed because of breaking Nature's fundamental laws of life.

We are at the entrance of a great campaign for race betterment, which must change the physical, mental and moral qualities of the race through improved nutrition; first of prospective parents, that they may prepare them for reproduction; second, of the child and adult, that he may keep well after a good start. There will be two conspicuous groups in this work: those who lift and those who lean. It should be expected that the dental profession will change

from the latter to the former in this matter. It would indeed be appropriate if the dentist should undertake responsibility for promoting educational programs in grade and high schools and colleges, teaching each generation of pupils to better prepare themselves for their responsibility concerning the unborn generations. There is available for this type of program a vast number of new data including the accumulated wisdom of primitive races. In the fourteen primitive races that I have studied, the incidence of dental caries, for example, averaged approximately one tooth per hundred teeth in isolated groups, but increased to an average of thirty teeth for each hundred teeth for modern groups.

Indeed it would be appropriate for all organized dentistry, through its various branches, to undertake to provide courses of public instruction on the prevention of dental disease, through educational institutions, parent-teacher associations and all uplift organizations. This, the Cleveland Dental Society is undertaking to do with an organized program. Enlightenment of the masses can correct the fallacies regarding both injuries due to faulty nutrition and those handicaps and injuries which formerly were considered due to transfer of faulty hereditary traits, but which, in the new light, have been shown to be due to defects of the germ cells (intercepted heredity) because of vitamin starvation of the parents. Surely no branch of health service has a more golden opportunity for accomplishing race betterment than have the members of the dental profession.

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