

**Refined Foods, Ruined Soils, and Rotten Teeth:  
Weston A. Price's Critique of the Industrial Food System**

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After having studied the superb teeth of several poor, isolated Swiss mountain communities in 1932, Weston Price and his wife Florence came upon what he describes as “the beautiful and modern city and summer resort of St. Moritz.” Price tells the reader that

One would scarcely expect to see so modern a city as St. Moritz at an altitude of a little over a mile, with little else to attract people than its climate in winter and summer, the magnificent scenery, and the clear atmosphere. We have passed from the communities where almost everyone wears homespuns to one of English walking coats and the most elegant of feminine attire. Everyone shows the effect of contact with culture.

But immediately, something seemed deeply amiss in St. Moritz. “The children have not the splendidly developed features,” Price says, “and the people give no evidence of the great physical reserve that is present in the smaller communities.” The teeth of the children Price examined, he comments further, “were shining and clean, giving eloquent testimony of the thoroughness of the instructions in the use of the modern dentifrices for efficient oral prophylaxis.” But fully 29 percent “had already been attacked by dental caries.”<sup>1</sup>

Clearly, there was something that the primitive isolated communities were doing right that the “cultured” residents of St. Moritz weren’t, but what was it? And more basically: What was Price, a dentist from Cleveland, Ohio doing in the Swiss Alps in 1932? In order to address these questions, we will need to delve briefly into the history of Price’s professional and intellectual evolution. I will explain the close connection between Price’s lifelong career as a dentist and the course he embarked on later in life as a critic of food processing industries, dietary habits, and poor agronomic practices. I will gloss over the methodological problems with Price’s work and focus on the ways in which Price was both the beneficiary and ultimate victim of the larger historical forces of his time. I hope to demonstrate that Price’s experience in St. Moritz serves as a perfect allegory to his entire view of the modern, industrial civilization he belonged to: despite all the professional expertise, glimmering technology, and costly effort expended to resolve the rising crescendo of degeneration, Price saw that an inner rot still remained.

Price’s early contributions to the dentistry literature from about the 1890s to the 1910s show the signs of a highly successful, albeit conventional, career in dental research. In 1915, the National Dental Association made Price the Director of its Research Institute in Cleveland, Ohio. Price devoted much of his time to the study of root canals. After doing extensive and sometimes frustrating studies, he came to the somewhat unorthodox conclusion that susceptibility to tooth decay originated from dysfunction *inside* the body, rather than from bad bacteria acting from the

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<sup>1</sup> Weston Price, *Nutrition and Physical Degeneration* (La Mesa, CA: Price-Pottenger Nutrition Foundation, 2004 [1939]), 36-37.

*outside*. That is, the circulatory system, tied as it was to the digestive system, wasn't delivering what was needed to the teeth.<sup>2</sup> These findings brought Price fully to the study of nutrition.

Around the turn of the nineteenth century, when Price was just beginning his career in dentistry, "nutrition" had come into its own as an applied science following the discovery that food's energy could be measured in calories and that these energy units were composed of proteins, carbohydrates, and fats, each of which seemed to have a unique physiological function. But these discoveries were soon overshadowed by a rapid succession of breakthroughs that unearthed the presence of vitamins and minerals in foods and their importance to human and animal health. Within a relatively short period of time, from roughly 1910s to 1930s, researchers discovered most of the vitamins that are necessary for animal and human health: A, the B series, C, D, E, and K. To take just a few examples: Studies showed that diets deficient in vitamin A led to inhibited growth, glandular atrophy, and the proliferation of harmful bacteria in the intestines. Later investigations confirmed that vitamin A and D deficiency resulted in abnormal calcium and phosphorus deposition, causing rickets, tetany, and arthritic conditions. By the 1920s, there was unanimity of opinion among scientists that vitamin C was required to prevent scurvy. It was later found that fat-soluble vitamin E, found in green leafy vegetables, whole grains, and fats from animals that fed on plant foods, was required to prevent sterility or abnormal reproduction. During these decades, researchers also made great strides in understanding the vital nutritional role of inorganic macro elements—calcium, phosphorus, magnesium, etc.—and trace elements—zinc, iodine, copper, cobalt, manganese, etc.—as well as the symbiotic relationship between them and certain vitamins.<sup>3</sup>

By the mid-1920s, Price's work began to show the impact of the recent vitamin and mineral discoveries. Price's accumulating experience as a dental practitioner and researcher was reaffirming to him that conventional dentistry was only symptomatically dealing with the worsening condition of patients' teeth and orthodontic structure. Indeed, Price was hardly alone in the dental profession at the time in suspecting that the sudden changes that had occurred in the diet were related to the deteriorating dental state of patients and the healthy growth of their line of work.<sup>4</sup> Refined white flour and sugar, polished rice, oleomargarine, pastries, and other highly processed foods had been gaining a more and more prominent role in the diet of Americans and Europeans since the latter half of the nineteenth century. But it was not until the discovery of vitamins and minerals that the nutritional poverty of these foods was scientifically confirmed. The vast bulk of Price's studies addressed the function of vitamin and mineral metabolism in

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<sup>2</sup> Price compiled his findings into a massive two-volume work, *Dental Infections, Oral and Systemic and Dental Infections and the Degenerative Diseases* (Cleveland, OH: The Penton Publishing Company, 1923).

<sup>3</sup> For an excellent précis of the development of nutrition science, written by one of the most prominent pioneers in the field, see Elmer Verner McCollum, *A History of Nutrition: The Sequence of Ideas in Nutrition Investigation* (Boston: Houghton Mifflin Company, 1957). See also E. V. McCollum, Elsa Orent-Keiles, and Harry G. Day, *The Newer Knowledge of Nutrition*, 5<sup>th</sup> Ed. (New York: The MacMillan Company, 1939).

<sup>4</sup> Alyssa Picard, "Making the American Mouth: Dental Professionalization, Dental Public Health, and the Construction of Identity in the 20th Century United States" (Ph.D. dissertation, University of Michigan 2004), Chap. 4. For a contemporary of Price, see Harold F. Hawkins, *Applied Nutrition* (La Habra, CA: International College of Applied Nutrition, 1977 [1947]).

preventing dental infections, but he was also increasingly concerned with its relation to other degenerative diseases as well. Like his counterparts, Price marveled at the rapid improvement in the average lifespan with the elimination of infectious diseases thanks to bacteriological science and public health improvements, but he noted in 1929 that “heart disease, cancer, kidney and bowel disorders, nervous break-downs are possibly more prevalent today than they were twenty and fifty years ago.” By the late 1920s, then, probably as a result of his own nutritional research, Price had come to the conclusion that “people are not dying of these degenerative diseases so much as they are getting the degenerative diseases because they are dying” slowly as a result of improper diets.<sup>5</sup>

Price’s work also reflects a growing awareness of the importance of “stored” ultraviolet light—in the form of vitamins A and D—in preventing disease. By analyzing thousands of butter samples sent to him at different times of the year from all over the world, Price found that mortality from heart disease and pneumonia, as well as the prevalence of dental caries, were lowest when the vitamin (or what he called “activator”) content of butter was highest during the months with the greatest amount of daylight. This is when dairy cows were typically feeding on fast-growing, young green pasture. Conversely, mortality and dental problems were highest in the winter and early spring when dairy cows were on grain and dried feeds and vitamin content was at its lowest.<sup>6</sup> Price realized that the fat-soluble vitamins as well as minerals from whole foods (calcium, phosphorus, iron, and magnesium) were the most important for prevention of tooth decay and degenerative disease, yet hardest to obtain in highly refined modern diets. He experimented with putting his worst dental patients on a special diet high in these activators and minerals and had great success in reversing their poor condition, including non-dental health problems such as rheumatism, without resorting to operations. Price’s intended audience therefore began to widen to those who produced foodstuffs and dealt with degenerative diseases more generally. Besides dental researchers, he addressed milk dealers, cereal chemists, public health workers, pediatricians, and the lay public.

Accompanying his greater interest in nutrition, Price appears to have been undergoing—for lack of a better term—a spiritual reorientation as well. His scientific interests cast a wide net. One of the most thrilling breakthroughs for Price was the spectroscope, which revealed that all the stars in the universe (and the sun) are made of the same elements as are present on Earth and in the human body—iron, calcium, magnesium, etc. The spectroscope could also detect forms of radiant energy not visible to the human eye that could be absorbed by chemicals in plants and animals and stored in the fatty tissues as what he called a “vitalizing force”—in other words, the fat-soluble vitamins.

Price was long influenced by Darwinism and genetics. And early on he, like many of his class and educational background, was an advocate of eugenics, although he had abandoned it by the early 1930s. He came to believe that Nature had established laws via evolution that each

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<sup>5</sup> Weston Price, “The Relation of Vitamines to Health and Disease” (Lecture read before the Cleveland Sorosis, Thursday Afternoon, December 20, 1928). File W213: PPNF Archives, La Mesa, CA.

<sup>6</sup> For example: Weston Price, “Some Biochemical and Clinical Aspects on the Relation of Light to Life and Health,” *Industrial and Engineering Chemistry* 18, No. 7 (July, 1926) (Read before Chemical Session at Second Chemical Equipment and Process and Engineering Exposition, Cleveland, May, 1926).

species has to follow to avoid degeneration. Humans, like other omnivores, had to obtain certain quantities of energy and matter from both plant and animal life. But all fauna ultimately rely on vegetation and the soil—the interface between the nonliving chemical elements of the Earth and the radiant energy of the sun that brings into being utilizable nutrients. Summing up the breathtaking novelty of this connection in a speech to fellow congregants at his Cleveland church in 1929, Price states:

Indeed, it is only the last twenty years perhaps that we have come to recognize through great research work that the energy that comes from the sun and from the stars... is an expression as energy of ultimate units which may come together in form and be matter or material.... The dinner we have eaten tonight was a part of the sun but a few months ago. We have actually eaten tonight a substance that was in the sun and came to the earth as energy.... I believe that science has done more to help us believe in God in the last few years than religion has done within the last fifty years.<sup>7</sup>

Thus, by the early 1930s, Price began to convey an understanding that everything was “ecologically” interrelated: the sun, the Earth, the soil, animal life, and the human body. Nutrition is simply the way that all life obtains the radiant energy and elemental matter of the universe, and in this way all of material existence is connected.

Once Price had arrived at his nutrition-based theory for dental and physical degeneration, he was unable to find the needed control groups among “modernized” people to test his ideas. So Price resorted to the study of what he terms “remnants of primitive racial stocks,” the results of which he compiled in his 1939 opus, *Nutrition and Physical Degeneration*. Price, already well into his middle ages when he decided to lock up his practice and spend nearly a decade making arduous journeys as a “dental anthropologist.” Price’s investigations initially took him to isolated villages in the Swiss Alps in 1931 and 1932, and then to several windswept islands off the coast of Scotland in the remote Outer Hebrides. He then studied Eskimos; various Indian tribes in Rocky Mountain Canada; Seminoles in the Florida Everglades; Melanesian and Polynesian South Sea islanders; Aborigines and Malays in Australia, Maoris in New Zealand; coastal Peruvian, Andean, and inland Amazonian Indians; and several African groups living near the inland lakes of Kenya, Belgian Congo and Tanganyika, as well as along the Upper Nile in Anglo-Egyptian Sudan. In every place, Price employed the same method of systematically analyzing and photographing the teeth of “isolated primitives” and those who had become modernized. He recorded the primitive dietaries and took numerous samples of their foodstuffs, which he preserved and later analyzed for their vitamin and mineral content. He took particular note of those that the “primitives” considered especially valuable for their well-being and for the special diets of expectant and nursing mothers.

The diets of the healthy “primitives” Price studied were all very different, at least on the surface. In the villages in the Swiss Alps where Price began his investigations, the “sturdy mountaineers” lived on ample quantities of rich dairy products, and dense rye bread, meat occasionally, soups, and the few vegetables and fruits they could cultivate and preserve during the short summer months. Price found that the children never brushed their teeth—in fact their teeth had, to quote Price, the “typical deposits of unscrubbed mouths” and were often covered in

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<sup>7</sup> “Lecture by Weston Price at Pilgrim Congregational Church” (November 13, 1928), 4-5. File W229: PPNF Archives, La Mesa, CA.

a green slime—but Price found that only about one percent of the teeth had any decay at all. Severe childhood illnesses were virtually nonexistent and the local doctor recounted to him that there had never been a single case of tuberculosis—one of the primary killers in Price’s time that he consistently encountered among primitives who had switched to modern foods. For Gaelic “primitives” living in the Hebrides, fish and various seafoods formed the mainstay of the diet, along with oats made into porridge and oatcakes. The Eskimo diet, composed largely of fish and game meat, fish roe and marine animals, including seal oil and blubber, allowed Eskimo mothers to produce one sturdy baby after another without suffering any health problems or tooth decay. Natives in Canada, the Everglades, the Amazon, the Andes, Australia and the South Pacific consumed game animals, particularly the parts that “civilized” people tend to avoid—organ meats, glands, blood, marrow and the adrenal glands—as well as a variety of grains, tubers, vegetables and fruits that were seasonally available. Probably the most physically and dentally superb peoples Price ever encountered were the several tribes living along the upper Nile River where a nearly ideal environment allowed them to live largely on fish, dairy, meat, and blood from pastured cattle.

Price concluded that the foods that allow people of every “race” and every climate to be healthy were whole foods with an emphasis on copious amounts of animal fats high in fat-soluble vitamins—meat, organs, whole milk products, fish and seafood, insects—as well as vegetable foods high in calcium, phosphorus, potassium, magnesium, iron, and other “body-building” minerals. From the samples of native foods that he studied in his laboratory, Price found that the diets of “isolated primitives” contained at least four times the minerals and water-soluble vitamins—vitamins C and B-complex—as the American diet of his day. It was when Price analyzed the fat-soluble vitamins from animal fats that the contrast between the diets of “primitive” and “modern” civilizations was most astounding: the former contained, on average, at least *ten* times more vitamins A and D than the American diet of his day.<sup>8</sup> In almost every location, Price makes reference to the primitives’ “splendid physical development” and an almost complete absence of degenerative disease, even those living in physical environments that were extremely harsh.

For Price, modern concoctions made with white sugar, refined flour, polished rice, canned goods, and refined vegetable oils were the enemies lurking in the distance. They formed the advanced guard of the assault on “isolated primitives” as “modern civilization” spread its degenerative tentacles via outpost trade, Christian missionary settlements, and colonial ventures. Through vivid descriptions and photographs, Price repeatedly showed each “race” encountering the same problems that he observed in modern civilization: decayed teeth, increased susceptibility to infectious and degenerative diseases, and painful birthing and frequent miscarriage. The generation of offspring from parents who adopted the “foods of modern commerce” also manifested parallels to the increasingly “degenerate” American and European populations he observed in his practice at home.

In his later work, Price developed his argument in a direction that cut even more deeply at the confidence of American and Europeans: agriculture. Until post-World War II developments in chemical fertilizers, farm machines, and higher-yielding seed varieties, this confidence had in fact been quite shaky. Many European countries had to import large quantities of food as a prerequisite for industrialization, which became a serious foreign policy issue before

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<sup>8</sup> Price, *Nutrition and Physical Degeneration*, 259-68.

and after World War I.<sup>9</sup> The United States, despite its production of large surpluses, was chastened by the Dust Bowl of the mid-1930s, and there was a long-acknowledged awareness of the profligacy of its farming practices. Price was directly influenced by Barry Sear's *Deserts on the March* (1935), one of the earliest of many soil erosion jeremiads written in the 1930s and 40s in reaction to the Dust Bowl in the US and the increasingly obvious erosion problems worldwide. Price also conducted his own research and collected much more from scientists around the world on the relationship between soil fertility and plant and livestock health.<sup>10</sup> For example, drawing on his own and others' work, Price contended that the nutritional content of wheat from the same seed stock varied greatly depending on the fertility of soils from which it was grown.<sup>11</sup>

Unlike modern agriculture, Price observed that underlying the continued successful reproduction of each "primitive racial stock" was what we would today call a "sustainable relationship with the soil." Although refined grains, flour, sugar, and fats tended to provide ample energy without the vital vitamins and minerals attached, the problem could largely be resolved by simply altering the diet—the issue was elimination of harmful food processing and proper education of the consumer. However, an "agriculture of spoliation" that produced nutritionally deficient foods was much more difficult to amend because, Price realized, doing so involved an alteration in the dysfunction between rural hinterland and city that had come to define the physical landscape of "modern civilization." As Price's earlier analysis of vitamin and mineral content of foods made clear, it was not enough for people to simply consume unrefined foods. They needed to come fresh from fertile soils in conditions that maximized their nutrient content.

Price forebodingly believed that "modern civilization" was cursing future generations by transporting *en masse* the vital mineral elements of agricultural soils to urban consumers hundreds of miles distant, where they would be washed down the sewer or otherwise dissipated. Price commented in 1938 that:

In Nature's management of the animal and plant life, each animal and plant borrows enough of the various minerals to build its body, and when it is through with the loan returns these chemicals to the soil. This has been the policy of the surviving primitive races. There is accordingly no depletion associated with this usage. Our modern civilization returns exceedingly little of what it borrows. Vast fleets are busy carrying the limited minerals of far flung districts to distant markets.<sup>12</sup>

Price advocated the conservation of forest and vegetative cover. This was a practice that he found common among the "primitive races," particularly those with marginal soils. Price's praise for the parsimonious nature of the agriculture of "primitive races" was at the same time a

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<sup>9</sup> Avner Offer, *The First World War: An Agrarian Interpretation* (Oxford, UK: Clarendon Press; New York: Oxford University Press, 1989).

<sup>10</sup> Weston Price, "Mineral Deficiencies and Animal Disease," (unpublished manuscript, n.d.). File W227: PPNF Archives, La Mesa, CA.

<sup>11</sup> One of Price's colleagues, University of Missouri-Columbia soil scientist William A. Albrecht, collected rather incontrovertible evidence on this score. Albrecht contributed a chapter to the second edition of *Nutrition and Physical Degeneration* (1945) entitled "Food is Fabricated Soil Fertility."

<sup>12</sup> Price, "Dentistry and Race Destiny," *Dental Items of Interest* (October, 1938): 4-5.

condemnation of the long-distance transport of food that had become not just commonplace in North America and Europe, but a sign of progress. The urban-rural relationship that had emerged as part-and-parcel of “modern industrial civilization” was failing to obey what some agronomists at the time were calling “the Rule of Return.” Nutritionally speaking, the agricultural sector was producing devitalized foods in much the same way that the food processing industries were, and animal and human degeneration would inevitably raise as soil fertility fell.

What I found in the course of my research on Price, somewhat to my surprise, was that his nutritionally centered perspective on preventing dental and physical degeneration was hardly idiosyncratic at the time. There was a diverse transnational network of respected researchers whose work was akin to, and roughly contemporaneous with, that of Price. They presented a viewpoint that was paradoxically gaining in scientific rigor and comprehensiveness even as it was being professionally marginalized and, at times, lumped in with “food faddism.” Particularly from the postwar years onward, and for reasons that had more to do with larger economic, political, and cultural trends than purely scientific merit, the disciplines that these figures saw as necessarily interconnected developed into institutionally discrete vocations with more technically centered approaches. By way of a brief explanation for why this happened, it is worth noting that implicit in the kind of argument put forth by Price was the hope that the dental and medical professions would become almost unnecessary with greater understanding of nutrition, food, and agronomic science. He was, in other words, telling his fellow dentists in the 1930s and ‘40s that the growth and respectability of their profession was merely the symptom of a dysfunctional industrial food system, and that someone truly concerned with dental health would become in essence a home economist or dietician. (The gender implications, at that time, of such an argument could have played a substantial part in Price’s fall into obscurity.)

But, more recently, Price’s research has been undergoing something of a popular renaissance, due in large part to the increasing awareness that better and less costly routes could have been taken in the past several decades to prevent the multiple absurdities that characterize our current-day public health situation. There have been growing anxieties among consumers regarding the dubious impact of food processing industries and ever-changing governmental guidelines on human health, to say nothing of increasing skepticism in the ability of “Big Pharma” to stem the rise in degenerative diseases. In addition to the long-acknowledged dangers of agrochemicals to health, there is a substantial and growing body of research indicating that foods are composed of myriad chemical substances—phytonutrients, antioxidants, essential fatty acids, and so forth—that act on the body in much the same way as (and sometimes to a greater degree than) drugs. Along similar lines, recent studies have shown that the manner in which foods are grown can significantly affect their nutritional quality, which has given a boost to advocates of free-range and pasture-fed products.

A final point worth noting is that Price’s life and intellectual development shows that there was a conjunctural moment further in the past than is usually assumed that allowed for the emergence of a profound “environmentalist” critique—profound in that it was centered on the human organism itself—of what Michael Adas has incisively called the “technological imperative” of the “civilizing mission ideology.”<sup>13</sup> Price brought up, before *Silent Spring* in the

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<sup>13</sup> These terms come from Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance* (Ithaca, NY: Cornell University Press, 1989) and *Dominance*

1960s and global climate change more recently entered the popular consciousness, the very real possibility that we need to de-industrialize to stay healthy. It probably would have seemed like a much easier task for the residents of St. Moritz, Switzerland in 1932 than for us today.