

The Invention of Nutrition

Roderick Yang

Introduction

Today, one of the most common uses of the word “diet” is to refer to the act of changing one’s food consumption habits to lose weight. But the closest definition for the noun in the Oxford English Dictionary (O.E.D.) reads as follows:

3. Prescribed course of food, restricted in kind or limited in quantity, *esp.* for medical or penal reasons; regimen. Hence *to put to a diet* (F. *mettre à la diète*), *to keep* or *take diet* (F. *observer une diète*).¹

This sense of the word stretches back as far as Chaucer, but as the wording of the definition indicates, every usage example in the O.E.D. refers either to medical or penal purposes; there is no indication that the use of the term in the context of weight loss has significant history at all. Indeed, the earliest use of the term “diet” as a noun specifically tied to weight loss appears to be the naming of reduced sugar soft drinks, e.g., “Diet Pepsi,” which was first documented in 1963.² With the verb, there are more promising definitions, but nevertheless nothing specific to weight loss:

1. To feed, *esp.* in a particular way, or with specified kinds of food; to put (a person) to a specified diet.
2. To fix, prescribe, or regulate the food of (a person, etc.) in nature or quantity, for a purpose. *spec.*
 - a. as a regimen of health.
 - b. as a punishment, etc.³

The list continues in this manner; these are the two best fits for the modern notion. Entry 2. a. comes quite close, but it fails to capture that automatic association with weight loss that the word seems to carry today. Short of the reference to soft drinks, there is simply no well-documented history of the use of the word “diet” to refer specifically to weight loss.

The story is similar with nutrition, which has meant “nourishment or food” for well over 500 years but as a “branch of science” was only first used in 1903.⁴ How is it that two words, referring to the regular and common consumption of food and nourishment of the body, have become such complicated and scientific concepts? Diets can no longer consist simply of “food,” but are carefully designed to take into account the latest understanding of human physiology and biological chemistry, while nutrition warrants its own specialized health care professionals.

There is no question in the minds of most modern Americans that nutrition is part of a healthy lifestyle. While it may not come immediately to mind as the major factor in maintaining

¹ “diet, *n.*” *The Oxford English Dictionary*, 2nd ed. London: Oxford University Press, 1989. The Oxford English Dictionary is particularly valuable for its usage histories; while other dictionaries do list the definitions I seek, they do not offer any history of the usage of the word in that sense, so it is impossible to determine when it first occurred.

² *Ibid.*

³ “diet, *v.*” *The Oxford English Dictionary*, 2nd ed. London: Oxford University Press, 1989.

⁴ “nutrition, *n.*” (OED Online, September 2009), <http://dictionary.oed.com/cgi/entry/00328677> (March 18, 2010).

one's health, it is certainly not seen as irrelevant. It is even part of one of the most hotly debated issues in the news in early 2010—the campaign for health care reform. President Barack Obama, on his White House Web site, presented his proposal for health care reform, which included a provision for “Providing American Families with Nutrition Information” as an element of “Prevention of Chronic Disease and Improving Public Health.”⁵ That the diets of Americans ought to be an issue of public health, or that nutrition should be a thing that can be taught to the general public by the Federal government, was not always the case. What is the science of nutrition, and where did it come from? And where is it going?

Health as Moderation

The idea that diet and health are closely related is a very old one. The ancient Greek physician and “father of medicine,” Hippocrates, recognized the importance of food in maintaining the health of the individual. It is clear that there was some understanding of the relationship between diet and health in the ancient Western world. But what was the nature of this understanding?

Since it is essential to our survival, we must eat something. With respect to the pursuit of health, then, the fundamental questions might be framed as: what kinds of things ought we to eat, and how much? In the ancient world - and indeed, until relatively recently - the relationship between diet and health was usually understood in terms of the latter question.

The second century Roman physician Galen articulated the notion of the six “non-naturals,” distinct from the “naturals” (innate characteristics of the individual) and “præternaturals” (diseases or ailments). Together, the naturals, non-naturals and præternaturals determined the health of an individual.⁶ In his *Ars medicinalis*, Galen wrote:

...if we make a classification of all the necessary factors which alter the body, to each of these will correspond a specific type of healthy cause. One category is contact with the ambient air; another is motion and rest of the body as a whole or of its individual parts. The third is sleep and waking; the fourth, substances taken; the fifth, substances voided or retained; the sixth, what happens to the soul.⁷

Food, being a “substance taken” and subsequently “voided or retained” was accounted for in this description. While Galen did make some specific comments on which foods were beneficial and which were detrimental, there was not a systematic account of what constituted a healthful diet. Instead, a more general principle concerning the six non-naturals was applied: moderation. In all things, the questions of quantity and even quality could be answered as some form of moderation.

⁵ “Title IV. Prevention of Chronic Disease and Improving Public Health” (The White House), <http://www.whitehouse.gov/health-care-meeting/proposal/titleiv/nutrition> (March 18, 2010).

⁶ Chester R. Burns, “The Nonnaturals: A Paradox in the Western Concept of Health,” *The Journal of Medicine and Philosophy* 1 (1976): 203–4.

⁷ P. N. Singer, trans., *Galen: Selected Works*, Oxford: Oxford University Press, 1997, 374.

Indeed, Galen went so far as to write, concerning affections of the soul, “nothing that happens without moderation is good.”⁸

In the case of food, moderation meant neither eating too much nor too little. In the Roman empire, there was a great deal of criticism directed toward what was perceived to be overeating. Physicians and natural philosophers advised greater moderation in food and drink, demonstrating a general understanding that moderate quantities of food were healthful.⁹ And Galen's concept of the non-naturals continued to be influential through the Enlightenment, and along with it this emphasis on moderation.

Particularly in the age of the Industrial Revolution, moderation typically meant eating less, since overeating tended to be a bigger problem than undereating; eating too little was almost never deliberate and usually a consequence of factors beyond the individual's control. Conversely, eating too much was thought to be both harmful and avoidable, indicating not only physical but moral defect. There were thus many admonitions directed toward perceived gluttony, especially in Victorian-influenced 19th century America. By many accounts, Americans ate far too much, far too fast.¹⁰ Consequent dietary reform movements yielded some long-lived ideas about healthful diets, and represented some of the earliest surviving ideas about what kinds of foods are healthful.

From Quantity to Quality

Sylvester Graham was a Presbyterian minister and temperance lecturer who in the early 19th century advocated a very strict lifestyle aimed ultimately at reducing sexual desire and stimulation. He claimed that certain foods could produce greater sexual stimulation and thus cause illness. On the basis of these ideas, Graham was a strong proponent of vegetarianism and the temperance movement, and a critic of processed foods such as white bread. It was the latter that motivated the creation of Graham flour and the Graham cracker, though the modern variant is a far cry from the bland, unstimulating whole wheat product that it was intended to be. His philosophy also naturally demanded very strict limits on sexual activity of all kinds, even within marriage, some of which persisted for many decades.¹¹

The Grahamite movement's most resilient legacy, however, came by way of William Andrus Alcott, a prolific author, health reformer, supporter of Graham, and most importantly, a physician. Alcott's credentials lent an air of scientific legitimacy to his ideas that Graham did not command. His publication *Vegetable Diet: As Sanctioned by Medical Men, and by Experience in All Ages* took essentially the same approach as Graham himself, blending scientific and moral concepts in a

⁸ Singer, *Galen: Selected Works*, 103.

⁹ Thomas Woody, *Life and Education in Early Societies*, New York: The Macmillan Company, 1949, 684.

¹⁰ Hillel Schwartz, *Never Satisfied* (New York: The Free Press, 1986), 42.

¹¹ Schwartz, *Never Satisfied*, 23–33.

“Christianized science.”¹² Given his limited appeal, Graham was likely much less influential in the development of the new, ostensibly scientifically-motivated vegetarian movement than Alcott. The vegetarian movement grew through the middle of the 19th century, punctuated by the founding of the American Vegetarian Society in 1850 and the emergence of a man named John Harvey Kellogg.

A native of a Seventh-Day Adventist community in Michigan, Kellogg received his M.D. from Bellevue Hospital Medical College in New York City. He was surrounded in his youth by literature advocating temperance, vegetarianism, and natural remedies. His most important contribution to the history of nutrition is almost certainly the flaked breakfast cereals that he developed for patients of his world-famous 1200-bed Battle Creek Sanitarium, an institution that he had expanded from the Adventists’ 20-bed Western House Reform Institute.¹³ Intended to be a kind of miniaturized Graham bread, Corn Flakes turned into a gold mine for Kellogg and his brother Will when they began to market and sell it. Kellogg’s efforts to commercialize his developments—the Sanitarium and Corn Flakes together attracted considerable fame and at least some fortune for Kellogg—and his devotion to “alternative” ideas such as hydrotherapy and a variety of health fads has drawn criticism.¹⁴ But his impact is undeniable; aside from breakfast cereals, Kellogg also invented peanut butter and a soy-based imitation of milk.¹⁵ Regardless of his motivations, Kellogg was in some ways ahead of his time; the health value of his Corn Flakes, inspired by Sylvester Graham’s objection to processed foods, would not truly be appreciated until many years later with developments in the understanding of carbohydrate metabolism. The same developments would also shed light on how a very obese man in the late 19th century managed to lose a lot of weight in short order.

Standing 5 feet 5 inches in stature and weighing 202 lbs. in the summer of 1862, William Banting had a body-mass index of 33.6, decidedly obese by modern standards, as well as those of his time.¹⁶ Moreover, Banting did not need a mathematical calculation to understand that he was in ill health; nearly 66 years old, he “could not stoop to tie [his] shoe, so to speak,” was “compelled to go down stairs slowly backwards” because of the pain in his joints, and had “been obliged to puff and blow with every slight exertion.”¹⁷ In search of a remedy, Banting eventually visited a

¹² James C. Whorton, “Historical development of vegetarianism,” *The American Journal of Clinical Nutrition* 59 (1994): 1105S.

¹³ Elizabeth Fee and Theodore M. Brown, “John Harvey Kellogg, MD: Health Reformer and Antismoking Crusader,” *American Journal of Public Health* 92 (2002): 935.

¹⁴ Paul F. Erwin, “Review of John Harvey Kellogg, M.D.,” *The Journal of American History* 58 (1971): 783–4.

¹⁵ Fee and Brown, “John Harvey Kellogg, MD,” 935.

¹⁶ Strictly speaking, while the principle of the body mass index (mass divided by the square of the height) had been described by Adolphe Quetelet by 1850, it was not used or widely known outside of Quetelet’s “social physics” in Banting’s time. As such, though there was no standard for body mass index *per se*, there was widespread anthropometry and his physical condition was undoubtedly indicative of noticeable obesity.

¹⁷ Banting, *Letter on Corpulence Addressed to the Public*, 3rd ed. (London: Harrison, 1864), 14.

physician named William Harvey (of no apparent relation to the 17th century physician of renown), who advised him to refrain from the consumption of foods rich in starch and sugar. In particular, Banting was “advised to abstain as much as possible” from “bread, butter, milk, sugar, beer, and potatoes.”¹⁸ Harvey had recently attended a lecture by the French physiologist Claude Bernard concerning sugar in the liver of diabetics; on the basis of the frequent coincidence of obesity and diabetes, Harvey devised what would become the first low-carbohydrate fad diet.¹⁹

So fantastic was the success of this diet that Banting decided to publish a short book conveying his experience, *Letter on Corpulence Addressed to the Public*, in May of 1863. By his death in 1878, nearly 60,000 copies of his book had been sold, Banting’s name became a gerund (*banting* for efforts to shed weight), and low-carbohydrate diets were well on their way to becoming the most popular method of weight loss in America.²⁰ While the popularity of banting in its original form did not last, Banting and his low-carbohydrate diet encapsulated the major change that was to come with the turn of the century. As Banting wrote in the Concluding Addenda to the 3rd edition of *Letter on Corpulence*, “I can now confidently say that *quantity* of diet may be safely left to the natural appetite; and that it is the *quality* only, which is essential to abate and cure corpulence.” And so it was that the traditional exhortations to moderate began to give way to a new conception of food as being composed of a variety of macroscopically inconspicuous (and often indistinguishable) constituents.

Toward a Scientific Diet

While there seemed to be no shortage of conjectural and anecdotally-founded dietary advice throughout the 19th century, the ideas of Graham, Banting, and Kellogg were paralleled by scientific discoveries that offered a legitimacy and widespread acceptance to novel concepts about what constituted food. Some of these new scientific ideas contradicted the principles of the fad diets, such as Kellogg’s devotion to the constant purging of the digestive tract, but other discoveries lent some support to what were otherwise radical new ideas, like Graham’s emphasis on the health value of unprocessed foods (though for entirely different reasons than Graham suggested). By 1908, recommended diets were published in newspapers and touted as “scientific.”²¹

In 1827, the physician-chemist William Prout first conceived of the general division of foodstuffs into sugars, fats, and proteins, reporting in a paper entitled “On the Ultimate

¹⁸ Banting, *Letter on Corpulence*, 17.

¹⁹ Schwartz, *Never Satisfied*, 100. Ironically, the 1923 Nobel Prize in Physiology or Medicine was co-awarded to Frederick Grant Banting and John James Richard Macleod “for the discovery of insulin.” Contrary to unsubstantiated claims on certain Web sites, there is no published evidence that Frederick Grant Banting was related in any non-trivial way to William Banting.

²⁰ Schwartz, *Never Satisfied*, 101.

²¹ “Health From a Scientific Diet,” *The New York Times*, May 3, 1908.

Composition of Simple Alimentary Substances” that “the principle alimentary matters employed by man...might be reduced to three great classes, namely, the *saccharine*, the *oily*, and the *albuminous*.”²² While it is recognized today for its landmark role in the history of nutrition, “On the Ultimate Composition of Simple Alimentary Substances” was primarily a *methods paper* in the modern lexicon (i.e. concerned with the description of an experimental technique; in this case, the study of saccharine food materials by combustion). Considered during Prout’s lifetime to be his most important paper (likely on the basis of its methodological insights), it earned him the Copley Medal, the Royal Society’s oldest and most prestigious award.²³ Prout himself continues to be remembered mostly for his work in urinalysis, physical chemistry, and showing that stomach acid is hydrochloric acid.²⁴

The proliferation of Prout’s “three great classes” into public awareness is difficult to trace, but by the middle of the century, the fundamental concept was being conveyed in public science lectures.²⁵ Certainly by the 1860s, with the publication of Banting’s *Letter on Corpulence*, much of the general public possessed at least some understanding of “starch and saccharine matter” in food.²⁶ Articles in *The New York Times* from the 1870s on the virtues of condensed food and vegetarianism made reference to the presence of “albumen” as the primary “nutriment” in beef and the division of food material into “carbonaceous and nitrogenous compounds; the former... divisible into the hydro-carbons (or fatty) and the carbo-hydrates (or saccharine).”²⁷

Understanding of the significance of these plainly visible but superficially indistinguishable types of alimentary material was still very basic. The German chemist Justus von Liebig, one of the major figures of mid 19th century natural science, determined after some experimentation with proteinaceous foods that Prout’s classes could be divided into the “fuel foods” (fats and carbohydrates) and “plastic food” (protein); the former was oxidized in to produce body heat while the latter was used to form new tissues.²⁸ His writings were highly influential and cited in the popular literature, while his work also led him to conclude (as McCollum writes, “without

²² William Prout, “On the Ultimate Composition of Simple Alimentary Substances; with Some Preliminary Remarks on the Analysis of Organized Bodies in General,” *Philosophical Transactions of the Royal Society of London* 117 (1827): 357.

²³ Louis Rosenfeld, “William Prout: Early 19th Century Physician-Chemist,” *Clinical Chemistry* 49 (2003): 702.

²⁴ Rosenfeld, “William Prout: Early 19th Century Physician-Chemist,” 703.

²⁵ “Franklin Lectures,” *The New York Times*, February 15, 1853.

²⁶ Banting, *Letter on Corpulence*, 17.

²⁷ “Cheap Living. A Study in Ways and Means. Condensed Food as An Alimentary Element—Historical Notes as to the Progress of the Art—Extent of Its Application in Domestic Economy,” *The New York Times*, April 24, 1870; “Scientific Principles of Vegetarianism,” *The New York Times*, September 3, 1876.

²⁸ Elmer V. McCollum, *A History of Nutrition: The Sequence of Ideas in Nutrition Investigations* (Boston: Houghton Mifflin Company, 1957), 93; “M. Liebig on the Source of Animal Heat,” *Provincial Medical Journal and Retrospect of the Medical Sciences* 4 (1842): 488–9. McCollum, whose work has long been recognized as the authoritative history of nutrition, examines this in considerably greater detail, but it is well beyond the scope of this modest work.

supporting evidence”) that muscle extracts “possessed unusual physiological significance,” and Liebig’s recommendation of beef extract led to its widespread popularity for many years.²⁹

Advancements in biochemical research in the same period also began to reveal the significance of other materials in the diet. These substances were unique because of their trace presence in the diet; distinct from Prout and Leibig’s major groupings, which described the gross composition of food, it became apparent to researchers that food contained very small amounts of mineral content, notably iron.³⁰ Of course, certain minerals were long understood to be present in certain kinds of food (e.g., sodium in salt), but the idea that naturally-occurring foods could contain naturally-occurring minerals, and moreover that it was a significant part of the diet, was relatively new.

But perhaps the most astounding and influential discovery of nutritionally significant trace substances in food was that of vitamins. It came about most proximally as a consequence of research into the cause of beriberi, a disease described at the time as “a multiple peripheral neuritis,” or inflammation of the peripheral nerves.³¹ More broadly, a variety of vitamin-deficiency diseases, such as scurvy and pellagra, that were understood to be diet-related conditions were the subjects of considerable research. In addition, the conclusion by Leibig and others that a diet was fundamentally reducible to a small set of compounds led to widespread experimentation on the effects of consuming, for example, only carbohydrates, protein and some minerals. These experiments almost invariably found that malnutrition would result, and scientists concluded that this account of nutrition was inadequate.³² And although James Lind, an 18th century British naval surgeon, is thought to have discovered that citrus in the diet was an effective treatment for scurvy in seamen, the question was still far from settled and the exact cause of scurvy generally continued to be unclear through the 19th century.³³ Eventually, as the nature of vitamin-deficiency diseases and the apparent incompleteness of Leibig’s nutritional theory came into focus, the products of biochemical research began to reinforce some (though not all) of the radical ideas about nutrition that Sylvester Graham had preached.

²⁹ McCollum, *A History of Nutrition*, 94; “Cheap Living,” 1870. Some of the popular articles that make reference to Liebig’s work include “Franklin Lectures,” 1853; “What to Eat, and When,” *The New York Times*, August 23, 1886. The latter article, though it notes the criticism that Liebig’s classification had received, also expresses that “the main facts...are indisputable.”

³⁰ C.H.F. Routh, “On the Nature of Food; With Some Remarks on the Varieties of Aliments to Be Supplied to the Army or Navy,” *London Journal of Medicine*, 4 (1852):516–543.

³¹ Patrick Manson, E. R. Rost, L. W. Sambon, et al., “A Discussion On Beri-Beri,” *The British Medical Journal* 2 (1902): 830.

³² McCollum, *A History of Nutrition*, 203–14.

³³ Michael Bartholomew, “James Lind and scurvy: a reevaluation,” *Journal for Maritime Research* (2002); Peter M. Dunn, “James Lind (1716-94) of Edinburgh and the treatment of scurvy,” *Archives of Disease in Childhood – Fetal and Neonatal Edition* 76 (1997): F64–5.

Like most scientific developments, the discovery of vitamins cannot justly be conveyed as a single moment of individual triumph. Indeed, it is debatable whether “the discovery of vitamins” was a particular thing at all; McCollum spends 10 of the 28 chapters of his book on research and discoveries related to vitamins or diseases of vitamin deficiency, citing research spanning some 40 years.³⁴ But if one must pinpoint a specific development that marked the seminal moment in the history of vitamins, it is almost certainly the body of research surrounding thiamin, or vitamin B₁, which was the first vitamin to be discovered. It was also in the course of studying the substance that the term “vitamine” was first coined.³⁵

In the course of his research in the Dutch East Indies into beriberi, the Dutch physician Christiaan Eijkman discovered serendipitously in 1896 that his experimental chicken population developed beriberi when fed only polished “white” rice, but was perfectly healthy when fed unpolished “brown” rice.³⁶ Eijkman hypothesized that the shavings contained an agent that counteracted some pathogenic property of the endosperm of the rice. A colleague, Adolphe Vorderman, published epidemiological findings from the Dutch East Indies prison system in support of the general hypothesis that something about polishing rice was correlated with an increased occurrence of beriberi.³⁷ But Gerrit Grijns, a physician from the University of Utrecht, was the first to report what would turn out to be the correct interpretation of Eijkman and Vorderman’s results; Grijns found that rice shavings could prevent beriberi even when the beriberi was caused by a diet free of white rice, suggesting that it was some nutritive substance in the pericarp itself that was conferring a protective effect, and that beriberi was fundamentally a disease of deficiency.³⁸ Researchers in the first decades of the 20th century labored to isolate this mysterious substance, the absence of which was responsible for beriberi, and some scientists hypothesized that a variety of other conditions—scurvy, pellagra, and maybe rickets—were caused by deficiencies of similar substances. In light of preliminary experimental evidence concerning the chemical nature of the beriberi compound, Casimir Funk proposed in 1912 that these substances all be referred to by the term “vitamines,” which suggested that all such substances were vital, and

³⁴ McCollum, *A History of Nutrition*, 201–318; 359–72; 376–83; 405–19.

³⁵ Kenneth J. Carpenter, “The Nobel Prize and the Discovery of Vitamins” (Nobel Foundation, June 22, 2004), http://nobelprize.org/nobel_prizes/medicine/articles/carpenter/index.html (March 15, 2010).

³⁶ Carpenter, “The Nobel Prize and the Discovery of Vitamins;” McCollum, *A History of Nutrition*, 216–7. These and other sources differ slightly on the details of Eijkman’s initial conclusions, and since the publications are Dutch, it was unfortunately not within the scope of this project to evaluate the primary source material.

³⁷ “Rice and Beri-Beri,” *The British Medical Journal* 2 (1898): 914–5.

³⁸ Carpenter, “The Nobel Prize and the Discovery of Vitamins;” McCollum, *A History of Nutrition*, 216–7.

chemically nitrogenous “amines.”³⁹ To this point the compound had only been described by indirect methods, and it was not until 1926 that vitamin B₁ would be isolated and purified.⁴⁰

Any modern chemist could tell you that the term “vitamin” is something of a misnomer given the chemical properties of all of the known vitamins. Edward Vedder noted presciently in 1916 that the name “vitamin,” though technically inaccurate (Funk had assumed that all vitamins were amines like thiamin had been observed to be, but this was not so), would persist by virtue of its convenience as a word. Pointing out that the term “vaccine” was also no longer strictly accurate given that most vaccines were completely unrelated to cows, Vedder wrote that “vitamin” was in any case greatly preferable to the unwieldy “accessory food factors” or similarly awkward alternatives.⁴¹ He was, of course, correct.

The scientific efforts surrounding the discovery, isolation, and characterization of the vitamins were widespread and protracted, and also very valuable to the field of biological chemistry. In all, at least five Nobel prizes were awarded to eight individuals for their contributions to the discovery, isolation, synthesis, or structural identification of vitamins.⁴² But it was a scientist in the employ of the United States Department of Agriculture (U.S.D.A.), working on a technique known as calorimetry—literally, the measurement of heat—who would leave what is probably the most significant individual legacy in the history of nutrition. His impact can be found in the most common way we think about the nutritional value of food and in the way Americans are informed as to what constitutes a healthful diet. And in 1993, the U.S.D.A., the International Life Sciences Institute Research Foundation, and the American Institute of Nutrition held the W.O. Atwater Centennial Celebration Symposium in recognition of the 100-year anniversary of his pioneering contribution to nutrition science and nutritional recommendations in America.⁴³

Wilbur Olin Atwater died before vitamins were discovered. Indeed, later work on vitamins would challenge some of the ideas he had promoted in his time, including the notion that fruits

³⁹ Casimir Funk, “On the chemical nature of the substance which cures polyneuritis in birds induced by a diet of polished rice,” *The Journal of Physiology* 43 (1911): 395–400; Funk, “The preparation of yeast and certain foodstuffs of the substance the deficiency of which in diet occasions polyneuritis in birds,” *The Journal of Physiology* 45 (1912): 75–81; McCollum, *A History of Nutrition*, 217.

⁴⁰ Carpenter, “The Nobel Prize and the Discovery of Vitamins.”

⁴¹ Edward B. Vedder, “The Relation of Diet to Beriberi and the Present Status of Our Knowledge of the Vitamins,” *Journal of the American Medical Association* 67 (1916): 1494–7.

⁴² *Ibid.* The Nobel Prize in Physiology or Medicine in 1929, 1937, and 1943, and the Nobel Prize in Chemistry in 1937 and 1938 were awarded for vitamin-related research.

⁴³ “W.O. Atwater Centennial Celebration Symposium: An Evaluation of Progress in Nutrition,” *The Journal of Nutrition* 124 (1994): Front matter. Interestingly, the symposium was also funded by the Kellogg Company and the National Live Stock & Meat Board. Atwater, influenced by Germans in the tradition of Leibig, had advocated a high-protein diet.

and vegetables were luxury food items.⁴⁴ But his role in establishing nutritional science within the U.S.D.A. and the publication of nutritional recommendations is undeniable. Atwater led efforts to document the energetic value of foods, which he intended to serve as a guide for families to make economical food purchasing decisions; he published articles suggesting that the average American ate far too much (and thus spent too much on food).⁴⁵ In the field of nutrition science, Atwater is perhaps best remembered for developing in the United States the calorimetry methods that he had learned in Germany, and the energy values that his research revealed (4, 4, and 9 kilocalories per gram from carbohydrates, protein, and fat respectively; these values are used as a “good enough” approximation in most applications even today). Atwater advocated for the utility and necessity of pursuing nutritional research efforts, and was undoubtedly instrumental in the establishment and development of such work by the U.S.D.A.⁴⁶

In 1894, as the first Director of the Office of Experiment Stations in the U.S.D.A. and Professor of Chemistry in Wesleyan University, Atwater wrote and the U.S.D.A. published *Farmers’ Bulletin No. 23, Foods: Nutritive Value and Cost*.⁴⁷ It was the first document on nutritional recommendation ever published by the U.S.D.A. In the bulletin, Atwater summarized the basic understanding of nutrition at the time—dividing food into protein, fat, carbohydrates, and “ash” (referring to “the mineral matter...which is left behind when [food] is burned”)—and explained the concept of food economy, whereby the nutritive value of food is maximized and the cost minimized.⁴⁸ Atwater also included extensive tables and charts of food composition, and explained how to decide which foods were most nutritive and healthful (based on the knowledge of the time, and his German influence which inclined him toward Leibig’s emphasis on protein in the diet).⁴⁹ Flawed and incomplete as it was, *Farmers’ Bulletin No. 23* began what would be a long tradition of U.S.D.A. and U.S. government nutritional recommendations.

A Century of Advice

Nutritional advice was by no means exclusive to the United States government. Popular literature was full of advice from lay persons, individual physicians and scientists, and (particularly in the wake of the discovery of vitamins) corporations. In the early 20th century, the popular

⁴⁴ Kenneth J. Carpenter, “The Life and Times of W.O. Atwater (1844–1907),” *The Journal of Nutrition* 124 (1994): 1707S–14S.

⁴⁵ Wilbur O. Atwater, “Food and Health,” *Public Health Papers and Reports* 15 (1889): 208–21.

⁴⁶ Carpenter, “The Life and Times of W.O. Atwater,” 1708S–11S; William J. Darby, “Contributions of Atwater and USDA to knowledge of Nutrient Requirements,” *The Journal of Nutrition* 124 (1994): 1734S–6S.

⁴⁷ U.S. Department of Agriculture, *Foods: Nutritive Value and Cost*, by W. O. Atwater, *Farmers’ Bulletin No. 23*, Washington, DC: Government Printing Office, 1894.

⁴⁸ U.S. Department of Agriculture, *Foods: Nutritive Value and Cost*, 4–10.

⁴⁹ U.S. Department of Agriculture, *Foods: Nutritive Value and Cost*, 10–30.

literature was dominated by Russell Henry Chittenden, a Yale physiological chemist, and a veritable mania surrounding the seemingly magical new “vitamines.”

Chittenden was one of the most important figures in modern biological chemistry. He was a member of the first editorial committee of the *American Journal of Physiology* in 1898, the founding president of the American Society of Biological Chemists in 1906, and a founding member of the American Institute of Nutrition in 1933.⁵⁰ But Chittenden did not confine his efforts to academia; articles from *The New York Times* in the first decades of the century often quoted him as an authority on matters of nutrition. He also wrote his own publications and books on nutrition, including a 300-page volume based on eight lectures on diet and nutrition from 1907 entitled *The Nutrition of Man*.⁵¹ The latter was reviewed positively by *The New York Times Saturday Review of Books*.⁵² One week after the review, an article in *The New York Times* reported that “*The Times* of that day had hardly begun to circulate before the publishers of the Chittenden book were being deluged with orders for it.... [N]o single review of a scientific book ever published by them had ever produced so much effect in so short a time as did the review of ‘*The Nutrition of Man*’ in *The Times*.” The article went on to examine in greater depth the issue of nutrition, drawing on a variety of sources.⁵³ Clearly, Chittenden had a dramatic impact on popular conceptions of nutrition and what constituted a healthful diet.

One of Chittenden’s main contributions was to challenge the notion, popular within the scientific community at the time, that diets ought to emphasize the plastic foods, or protein. This had originated with Liebig, whose enthusiasm for protein was reflected in his previously mentioned endorsement of beef extract, and was perpetuated by his successors in Europe.⁵⁴ Chittenden’s research at Yale showed that health and vigor could be maintained without eating nearly as much protein as others had been suggesting.⁵⁵ He focused at least three of the eight chapters in *The Nutrition of Man* on protein metabolism or diet, and it was on his thesis that Americans ate too much meat that the review and subsequent spread in *The New York Times* focused. While he criticized overconsumption of meat, Chittenden was not a vegetarian, and in fact he was described as not supporting “any ‘ism’ whatsoever.”⁵⁶ Instead, his recommendations, which he based on his scientific understanding, were surprisingly unremarkable—they amounted basically to an increased emphasis on moderation. However, this was not to say that Chittenden was not met with resistance. Though tame by today’s standards, the idea of reducing meat

⁵⁰ Howard B. Lewis, “Russell Henry Chittenden: (1856–1943),” *The Journal of Biological Chemistry* 153 (1944): 339–42.

⁵¹ Russel H. Chittenden, *The Nutrition of Man*, New York: Frederick A. Stokes Company, 1907.

⁵² Michael Williams, “We All Eat Too Much,” *The New York Times*, May 25, 1907.

⁵³ “What New Yorkers Eat vs What They Should,” *The New York Times*, June 2, 1907.

⁵⁴ McCollum, *A History of Nutrition*, 92–94; Lewis, “Russell Henry Chittenden,” 342.

⁵⁵ Chittenden, *The Nutrition of Man*, 176–189.

⁵⁶ Williams, “We All Eat Too Much.”

consumption was rather radical at the time, in part because it undermined the common, social Darwinian view that attributed the superiority of the industrial world to its masculinity, which included the vigorous consumption of meat.⁵⁷ U.S.D.A. dietary recommendations, still in their infancy, were not yet thought of as arbiters of proper diet.

Food faddism in the early 20th century was fairly widespread, with fads such as Fletcherism (obsessive mastication of food) and the consumption of raw food being quite popular.⁵⁸ Fletcherism, in particular, was constantly in the newspapers; its influence was such that it was mentioned in nearly every article about Chittenden or nutrition. But one fad was especially feverish, and it surrounded the latest discovery in nutrition science.

At least early on, the mysterious nature of vitamins—the first vitamin was indirectly described by 1912, but not isolated and purified until 1926—almost certainly contributed to the mania. Rima Apple suggests that vitamins “captured the imagination and attention of many in the scientific community and among the general public” between the wars.⁵⁹ Vitamins were touted in popular articles with titles like “a new weapon in the war against disease.”⁶⁰ Unlike Fletcherism or the earlier Grahamite movement, however, the obsession with vitamins was not driven by individual personalities; it was driven by corporations and advertising. Pharmaceutical companies like Squibb and H.A. Metz Laboratories targeted women through magazines such as *Good Housekeeping* with advertisements designed by the J. Walter Thompson Agency.⁶¹ This was a wholly different phenomenon than a mere fad, as it simply involved a far greater profit for the proprietor than, say, encouraging mastication. Vitamin sales in the United States were estimated to have exceeded \$130 million by 1942.⁶² The popular view that vitamins were somehow magical cures was alarming to some scientists; one editorial in the *Journal of the American Medical Association* warned against “the indiscriminate use of alleged vitamin-bearing preparations as popular therapeutic agents.”⁶³ In some ways the craze has never ended; the Council for Responsible Nutrition, a dietary supplement trade group, reports that as of 2007, dietary supplements are a \$23.7 billion industry in the U.S.⁶⁴

⁵⁷ Lewis, “Russell Henry Chittenden,” 342; “Parsimony in Nutrition. Sir James Crichton-Brown Takes Issue With Fletcherism,” *The New York Times*, August 23, 1908.

⁵⁸ “Health From a Scientific Diet,” *The New York Times*, May 3, 1908; Carrington, Hereward. “Uncooked Food the Best. Follow Nature’s Rule and Live on Fruits and Nuts,” *The New York Times*, January 17, 1909; “What and How a Normal Person Should Eat,” *The New York Times*, June 9, 1907.

⁵⁹ Rima D. Apple, *Vitamina: Vitamins in American Culture*, New Brunswick: Rutgers University Press, 1996, 13.

⁶⁰ Van Buren Thorne, “A New Weapon in the War Against Disease,” *The New York Times*, March 27, 1921.

⁶¹ Apple, *Vitamina*, 18–25.

⁶² Apple, *Vitamina*, 11.

⁶³ “Vitamin Theories,” *Journal of the American Medical Association* 79 (1922): 381–2.

⁶⁴ “Dietary Supplements: Safe, Beneficial and Regulated” (Council for Responsible Nutrition), <http://www.crnusa.org/CRNRegQandA.html> (March 17, 2010).

But the real story of food in 20th century America has been that of the U.S.D.A. and its dietary recommendations. More than any other organization or entity, the U.S.D.A. has shaped the way Americans think about a healthful diet throughout the past century. The ubiquity of the U.S.D.A. *Food Guide Pyramid* alone is powerful evidence of the influence the U.S.D.A. has had on American culture.

After Atwater's landmark 1894 publication, the first *food* guide (a guide for what foods to eat, as compared to Atwater's publication on nutrition education) ever published by the U.S.D.A. was written by Caroline Hunt in 1916.⁶⁵ Hunt's guide, *Food for Young Children*, contained five food groups: milk, eggs, fish, meat, cheese, dry beans, peas, and peanuts; cereals; vegetables and fruits; sugars; and fats. Several revisions were made throughout the 1920s, but the basic framework remained the same until 1933, when the economic considerations introduced by the Depression prompted the U.S.D.A. to release a guide written by Hazel Stiebeling, containing 12 food groups and placing special emphasis on the economical aspects of food selection.⁶⁶

The 1940s brought the second World War, and also the introduction in 1941 of Recommended Dietary Allowances (RDAs), which true to their name, listed recommended intake amounts for total calories (Atwater's kilocalories) as well as protein, iron, calcium, thiamin (vitamin B₁), riboflavin (vitamin B₂), niacin (vitamin B₃), ascorbic acid (vitamin C), and vitamins A and D. The National Wartime Nutrition Guide was released in 1943, which introduced the "Basic Seven" foundation diet, consisting of seven food groups. After the war, the 1946 revision, called simply the National Food Guide, removed references to rationing and wartime conservation efforts and was widely used until 1956.⁶⁷ It was printed as a simple pamphlet, with recommended serving amounts for each food group displayed on a colored wheel and explained in further detail when the pamphlet was unfolded. However, the groups themselves were sometimes unintuitive (in particular the "leafy, green, and yellow vegetables" group; the "citrus fruit, tomatoes, raw cabbage, and other high vitamin C foods" group; and the "potatoes and other vegetables and fruit" could be confusing), while guidelines for milk, cheese, and ice cream were complicated.⁶⁸

Despite their flaws, these early guides represented something that had been sorely lacking in dietary and nutritional recommendations in the preceding century. They were popular, relatively simple to use, designed for widespread consumption, and most importantly, they represented for

⁶⁵ Susan Welsh, "Atwater to the Present: Evolution of Nutrition Education," *The Journal of Nutrition* 124 (1994): 1799S; U.S. Department of Agriculture, Economic Research Service, Food and Rural Economics Division, *America's Eating Habits: Changes and Consequences*, Elizabeth Frazao, ed., Agriculture Information Bulletin No. (AIB750), Washington, DC: Government Printing Office, 1999, 35. Both sources agree that Hunt's was the first "food guide" published by the U.S.D.A.

⁶⁶ Welsh, "Atwater to the Present: Evolution of Nutrition Education," 1799S.

⁶⁷ U.S. Department of Agriculture, *America's Eating Habits: Changes and Consequences*, 35–6.

⁶⁸ U.S. Department of Agriculture, Agricultural Research Administration, Bureau of Human Nutrition and Home Economics, *National Food Guide*, Washington, DC: Government Printing Office, 1946.

the general public a consensus guideline on both *quantity* and *quality* of a healthful diet. The late 19th and early 20th century was a time of growth and upheaval in the understanding of nutrition, and was characterized by a general lack of agreement about what kinds of food were good. Vegetarianism and raw food advocates competed with vitamin and condensed food enthusiasts over the most healthful diet, and there was no authoritative voice in the fray. Every side had its token scientist or physician. With the emergence and maturation of the U.S.D.A. food recommendations, the multiplicity of ideas, though not silenced, was calmed.

The complicated Basic Seven was reduced to the Basic Four in 1956: milk; meat; fruits and vegetables; and grain products. And it was much simpler in its guidelines; two servings each from the milk and meat groups and four servings each from the fruits and vegetables and grain groups. The Basic Four would go on to serve as “the centerpiece of nutrition education for the next two decades.”⁶⁹ The next major dietary recommendation document, published by the U.S. Senate Select Committee on Nutrition and Human Needs, a committee chaired by Senator George Stanley McGovern, would prove rather controversial. Entitled *Dietary Goals for the United States*, the report included statements such as “too much fat, too much sugar or salt, can be and are linked directly to heart disease, cancer, obesity, and stroke, among other killer diseases.”⁷⁰ The report outlined six dietary goals, including increasing carbohydrate consumption and reducing fat, saturated fat, cholesterol, sugar, and salt consumption. Industry trade groups were livid; *Dietary Goals for the United States* came under attack from the National Cannery Association, National Cattlemen’s Association, the National Dairy Council, the National Livestock Feeders Association, the National Livestock and Meat Board, the Sugar Association, United Egg Producers, and oddly, the American Medical Association.⁷¹ By the end of the year, a second edition was published with a series of revisions that simultaneously emphasized the extensive scientific background supporting the original document and the complexity of the nutritional questions at hand, while effectively hedging on several of the goals by adding considerable specificity to avoid directly targeting any type of food backed by a powerful lobby (e.g., “decrease consumption of meat and increase consumption of poultry and fish” to “decrease consumption of animal fat, and choose meats, poultry and fish which will reduce saturated fat intake”).⁷²

Beyond the controversy that it inspired, *Dietary Goals for the United States* was a landmark document because it marked a shift from *recommendations* to *goals*. Recommendations suggest to the general public that these are the desirable kinds and amounts of foods to consume, etc. whereas goals create a target, which may or may not be immediately attainable, toward which to

⁶⁹ Welsh, “Atwater to the Present: Evolution of Nutrition Education,” 1801S.

⁷⁰ U.S. Senate, Select Committee on Nutrition and Human Needs, *Dietary Goals for the United States*, 2nd ed. 99th Cong., 1st sess, 1977, Committee Print, XII. Though this is the second edition, the quoted excerpt was retained intact from the first edition.

⁷¹ James P. Carter, “Eating in America; Dietary Goals for the United States; Report of the Select Committee on Nutrition and Human Needs, U.S. Senate,” *American Journal of Tropical Medicine and Hygiene* 27 (1978): 370.

⁷² U.S. Senate, *Dietary Goals for the United States*, XXI–XXXIX.

strive. This shift was quite clearly in response to mounting evidence that Americans were not achieving desirable *health goals*, as reflected in Senator McGovern’s prefacing statement. It was also hitherto the most emphatic statement by the U.S. government that issues of diet and nutrition were issues of *public health*. By 1949, over ⅓ of all deaths in the United States were attributable to “diseases of heart,” and by 1975 six of the top 10 causes of death as classified by the Eighth Revision of the International Classification of Diseases were chronic conditions (diseases of heart, malignant neoplasms, cerebrovascular diseases, diabetes mellitus, cirrhosis of liver, and arteriosclerosis).⁷³ This was also consistent with a long trend since the 1910s, when heart disease overtook respiratory conditions as the leading cause of death in the United States, paralleling an ever-increasing focus on nutrition and diet.

The publication of the Surgeon General’s report *Healthy People* in 1979 confirmed a commitment by the U.S. government to pursue preventive health measures as an issue of public health in the face of increasingly prevalent chronic illnesses: “[*Healthy People*] represents an emerging consensus among scientists and the health community that the Nation’s health strategy *must be dramatically recast to emphasize the prevention of disease* [emphasis added].”⁷⁴ *Healthy People* also emphasized nutrition goals for children, noting that “obesity—a risk factor for hypertension, heart disease and diabetes—frequently begins in childhood,” and made reference in Chapter 10, “Health Promotion,” to “The Obesity Problem.”⁷⁵

The U.S.D.A. and Department of Health and Human Services (D.H.H.S.) collaborated in response to *Healthy People* to develop and issue the first edition of *Nutrition and Your Health: Dietary Guidelines for Americans* in 1980. The guidelines focused on maintaining recommended body weight and limiting fat, saturated fat, cholesterol, and sodium; the recommendations were not highly quantitative in the 1980 edition.⁷⁶ The *Dietary Guidelines*, revised and reissued by the U.S.D.A. and D.H.H.S every five years, remain a definitive source of dietary and nutritional guidance and serve as the basis for Federal food and nutrition education programs.⁷⁷ The U.S.D.A. also developed a new food guide in the mid-1980s to help implement the *Dietary Guidelines* in Americans’ everyday lives. *A Pattern for Daily Food Choices*, first displayed as a wheel graphic in 1984, outlined five major food groups: the bread, cereal, rice and pasta group; the vegetable group; the fruit group; the milk, yogurt, and cheese group; and the meat, poultry, fish,

⁷³ “Leading Causes of Death, 1900–1998,” Centers for Disease Control and Prevention, http://www.cdc.gov/nchs/data/dvs/lead1900_98.pdf (February 22, 2010).

⁷⁴ U.S. Department of Health, Education, and Welfare, Public Health Service, Office of the Assistant Secretary for Health and Surgeon General, *Healthy People: The Surgeon General’s Report on Health Promotion and Disease Prevention*, Washington, DC: Government Printing Office, 1979, vii.

⁷⁵ U.S. Department of Health, Education, and Welfare, “*Healthy People*,” 38, 129.

⁷⁶ U.S. Department of Agriculture, *America’s Eating Habits: Changes and Consequences*, 37.

⁷⁷ “Dietary Guidelines for Americans” (United States Department of Agriculture, March 03, 2010), <http://www.cnpp.usda.gov/DietaryGuidelines.htm> (March 17, 2010); U.S. Department of Agriculture, *America’s Eating Habits: Changes and Consequences*, 40.

dry beans, eggs, and nuts group. It also “recommended sparing use” of the sixth group: fats, oils, and sweets.⁷⁸ This scheme ought to be of great familiarity to anyone who grew up in the United States in the 1980s or 1990s, as it is nearly identical to another geometrically-shaped guide that would be released in 1992.

In 1988, the Surgeon General released the voluminous (~700 page) *The Surgeon General's Report on Nutrition and Health*. In striking contrast to Atwater's publication 94 years prior, which had exactly one author, this report spent 23 pages listing contributors and acknowledgements.⁷⁹ A comprehensive review of “the scientific evidence that relates dietary excesses and imbalances to chronic diseases,” *The Surgeon General's Report on Nutrition and Health* recommended reduced consumption of “fat (especially saturated fat) and cholesterol;” increased consumption of “whole grain foods and cereal products, vegetables, and fruits;” reduced intake of sodium; consumption of alcohol “only in moderation..., if at all;” and maintenance of “a desirable body weight” by limiting consumption of foods “relatively high in calories, fats, and sugars” while increasing energy expenditure.⁸⁰ The objections of industry groups notwithstanding, the report again pointed out the evidence that certain foods and diets were linked to chronic diseases and made recommendations that were strikingly similar to those in the 1977 *Dietary Goals for the United States*.

Though *A Pattern for Daily Food Choices* and the recommendations therein had been circulating in U.S.D.A. for several years by this time, the Department felt that it was not sufficiently well known. In order to increase its exposure and public awareness, a graphic was developed to convey the concepts to the general public. Focus groups criticized a circle graphic as “unimaginative, old-fashioned, or providing information already known,” while graphics based on block sizes and omitting the fats, oils, and sweets group were “did not convey enough information.”⁸¹ After eliminating the inverted pyramid or funnel because it seemed off-balance, the choice was made to go with an upright pyramid, which focus group participants found “new, interesting and ‘easy to memorize.’”⁸² The *Food Guide Pyramid* was found to be most effective in both adults and children, and released in April 1992; it has seen widespread use in nutrition and health settings and by educators, the media, and the food industry. It has appeared on posters, in textbooks, in school lunchrooms, computer software, food labels, and the like.⁸³

While the beginning of the 20th century was marked by the emergence of *what kinds of food* from a world in which the question had always been *how much food*, by the end of it both

⁷⁸ U.S. Department of Agriculture, *America's Eating Habits: Changes and Consequences*, 37.

⁷⁹ U.S. Department of Health and Human Services, Public Health Service, *The Surgeon General's Report on Nutrition and Health*, Washington, DC: Government Printing Office, 1988, xiv–xxxvii.

⁸⁰ U.S. Department of Health and Human Services, *The Surgeon General's Report on Nutrition and Health*, 1.

⁸¹ Welsh, “Atwater to the Present: Evolution of Nutrition Education,” 1806S.

⁸² *Ibid.*

⁸³ U.S. Department of Agriculture, *America's Eating Habits: Changes and Consequences*, 44.

questions were highly relevant. Considerations of quality had by no means unseated quantity from the position it had occupied since the days of Galen, but they had to be taken seriously in a way that was never the case before. The non-naturals saw a kind of vindication in the newfound emphasis on moderation in the late 20th century, and recommendations to consume more complex carbohydrates offered a qualified confirmation of elements of Graham and Kellogg's theories. Even some of the most recent developments in nutrition and dietetics reveal, upon inspection, connections and parallels to long-standing ideas. Perhaps the author of the book of Ecclesiastes was correct to assert that "[t]he thing that hath been, it is that which shall be; and that which is done is that which shall be done: and there is no new thing under the sun."⁸⁴

Old & New

The early years of the 21st century have shown us that food faddism is by no means behind us. The "Atkins diet" phenomenon swept the nation in the first half of the decade, despite already being some 30 years old at the time. Though Robert Atkins first published *Diet Revolution*, in which he advocated a low-carbohydrate, high-fat diet, in 1972, the emergence of new popular and scientific literature suggesting that the contrarian Atkins diet might be legitimately useful led to a huge resurgence in its popularity.⁸⁵ National Public Radio reported that at its height, the Atkins craze reached nearly 10% of Americans.⁸⁶ It was also not especially well-received in the scientific community; the American Medical Association had been challenging Atkins, arguing that his diet was not only ineffective but potentially harmful, since the 1970s. Most scientists at the time considered the evidence equivocal at best.⁸⁷

If the thought of a scientifically controversial but wildly popular idea about nutrition is just a little familiar, one can hardly be surprised. Diet fads, well-founded or not, have been around since the very earliest systematic ideas about *what to eat* began to enter the public discourse in the 19th century with figures like Graham. And the Atkins fad certainly recalls yet another mid-19th century figure, who made waves with the idea that restricting carbohydrates in his diet was an effective method of weight loss.

A 1981 study published in the *American Journal of Clinical Nutrition* introduced the concept of "glycemic index" as a new, more adequate measurement of the impact of a meal on the insulin

⁸⁴ Ecclesiastes 1:9 (King James Version)

⁸⁵ Gary Taubes, "What if It's All Been a Big Fat Lie?" *The New York Times*, July 7, 2002, E22.

⁸⁶ "Atkins Bankruptcy a Boon for Pasta Makers," *Morning Edition*, National Public Radio, Seattle, WA: KUOW, August 3, 2005.

⁸⁷ A. Harper and A. Astrup, "Can we advise our obese patients to follow the Atkins diet?" *Obesity Reviews* 5 (2004): 93–4; Dean Ornish, "Was Dr. Atkins Right?" *Journal of the American Dietetic Association* 104 (2004): 537–42.

levels of a diabetic individual.⁸⁸ Prior to the glycemic index concept, diabetics managed their diets based on lists of carbohydrate content, with no regard for how the carbohydrates would be metabolized upon consumption and what the consequent effect would be on their insulin and blood glucose levels. The authors of the 1981 study found a series of striking results: foods with similar carbohydrate content by mass produced greatly differing blood glucose levels; foods with the lowest glycemic indices (i.e. effected the lowest blood glucose levels) were more likely to be eaten by inhabitants of poorer regions of the world, and included oatmeal, spaghetti, buckwheat, yam, sweet potato, and dried legumes; and glycemic index was neither correlated with dietary fiber content nor sugar content, but did show *negative* correlation with fat and protein content.⁸⁹

Controversial at the time, the glycemic index has come into widespread mainstream acceptance as a useful way of measuring carbohydrate content; a committee of experts gathered by the Food and Agriculture Organization of the United Nations and the World Health Organization “endorsed the use of the GI [glycemic index] method for classifying carbohydrate-rich foods...” and “advocated the consumption of a high-carbohydrate diet...with the bulk of carbohydrate-containing foods being rich in nonstarch polysaccharides with a low GI.”⁹⁰ The glycemic index theory does not unequivocally support, but offers a plausible scientific basis for certain claims made regarding fad diets such as the low-carbohydrate, *ad libitum*-fat diets of Atkins and Banting, showing once again that history does have a certain tendency to repeat itself.

But the glycemic index is just one more in a long line of theories about how dissecting the various chemical compounds in our diets can help us to decide which food to eat. Since the days of Prout and Liebig, scientists have conceited the ability to describe in whole the nutritive values of foods as a function of their chemical composition. With developments in technology, our ability to describe has never been greater, and yet our ability to identify the most healthful foods seems not to have improved significantly, if at all. In the face of what has arguably been an overabundance of nutritional information, some have chosen instead to turn back to ostensibly simpler times.

Michael Pollan is a best-selling author and advocate of what can be described as a movement to eat “real food,” an effort that is captured well in his books *The Omnivore’s Dilemma: A Natural History of Four Meals* and *In Defense of Food: An Eater’s Manifesto*. Pollan explores what “food” is for most Americans today and how it came to be that way, noting the impact that efforts at reductionism have had in turning what used to be proximate products of living processes into

⁸⁸ David J. A. Jenkins, Thomas M. S. Wolever, Rodney H. Taylor, Helen Barker, Hashmein Fielden, Janet M. Baldwin, Allen C. Bowling, Hillary C. Newman, Alexandra L. Jenkins, and David V. Goff, “Glycemic index of foods: a physiological basis for carbohydrate exchange,” *The American Journal of Clinical Nutrition* 34 (1981): 362–6.

⁸⁹ Jenkins et al., “Glycemic index of foods,” 364–6.

⁹⁰ Kaye Foster-Powell, Susanna H. A. Holt, and Janette C. Brand-Miller, “International table of glycemic index and glycemic load values: 2002,” *The American Journal of Clinical Nutrition* 76 (2002): 5.

very distal products mostly of corn.⁹¹ Pollan points to the revisions in the second edition of the 1977 *Dietary Goals for the United States*, made in hasty response to industry outrage, as being the origin of a kind of “nutritionism”—McGovern and his colleagues, by Pollan’s account, inadvertently turned an otherwise straightforward set of recommendations about actual foods into recommendations about the constituent nutrient compounds in foods. And according to Pollan, it is this nutrient-based mindset that has turned food, which used to be plant and animal products, into a pile of chemicals.⁹² There is much to be said for his thesis, which acquits itself relatively well upon inspection and which is generally consistent with the history of nutrition. What is far harder to decide is whether we are better or worse off today—food may be a pile of chemicals, but it is hard to argue that “nutritionism” has not made it easier to determine basic needs and nutritional requirements for circumstances of great need.

If at the end of the day, the historical narrative is relatively simple, it only means that the historian has not done his or her job correctly. In the history of food and dietary recommendations in the United States, the march toward a fully reductionist view of food has rarely faced the kind of push-back that Pollan proposes. And it is hard to separate the “nutritionist” project from the broader scientific endeavor to describe the world as a fundamentally coherent, reducible, materialistic system. But if there is a consequential difference, it is that the foods we eat and the ways we eat them need not necessarily parrot the scientific understanding of the time. If we are to take any lessons from history, as many historians constantly insist is the chief value of the discipline in the first place, perhaps it should be the cautionary tale of Liebig’s errors. A brilliant chemist by any measure, Liebig was nevertheless mistaken about the nature of food, not in any fundamental way, but simply because his theory was incomplete. There is likewise no great reason to suspect that we have obtained a complete picture of the situation. Perhaps, then, it is most apt to take Pollan’s wonderfully succinct advice: “Eat food. Not too much. Mostly plants.”⁹³ Truly there is nothing new under the sun; we have arrived at long last, and once more, at the beginning of nutrition.

⁹¹ Michael Pollan, *The Omnivore’s Dilemma: A Natural History of Four Meals*, New York: Penguin Books, 2006.

⁹² Michael Pollan, “Unhappy Meals,” *The New York Times Magazine*, January 28, 2007, 41.

⁹³ Pollan, “Unhappy Meals,” 40.

Bibliography

- Alcott, William A. *Vegetable Diet: As Sanctioned by Medical Men, and by Experience in All Ages*, 2nd ed. New York: Fowler and Wells, Publishers, 1859.
- Apple, Rima D. *Vitamina: Vitamins in American Culture*. New Brunswick: Rutgers University Press, 1996.
- “Atkins Bankruptcy a Boon for Pasta Makers.” *Morning Edition*. National Public Radio. Seattle, WA: KUOW, August 3, 2005.
- Atwater, Wilbur O. “Food and Health.” *Public Health Papers and Reports* 15 (1889): 208–21.
- Banting, William. *Letter on Corpulence Addressed to the Public*. 3rd ed. London: Harrison, 1864.
- Bartholomew, Michael. “James Lind and scurvy: a reevaluation.” *Journal for Maritime Research* (2002).
- Bayles, J. C. “Food and Health.” *The New York Times*, September 24, 1904.
- Burns, Chester R. “The Nonnaturals: A Paradox in the Western Concept of Health.” *The Journal of Medicine and Philosophy* 1 (1976): 202–11.
- Carpenter, Kenneth J. “The Life and Times of W.O. Atwater (1844–1907).” *The Journal of Nutrition* 124 (1994): 1707S–14S.
- Carpenter, Kenneth J. “The Nobel Prize and the Discovery of Vitamins” (Nobel Foundation, June 22, 2004). http://nobelprize.org/nobel_prizes/medicine/articles/carpenter/index.html (March 15, 2010).
- Carrington, Hereward. “Uncooked Food the Best. Follow Nature’s Rule and Live on Fruits and Nuts.” *The New York Times*, January 17, 1909.
- Carter, James P. “Eating in America; Dietary Goals for the United States; Report of the Select Committee on Nutrition and Human Needs, U.S. Senate.” *American Journal of Tropical Medicine and Hygiene* 27 (1978): 369–70.
- “Cheap Living. A Study in Ways and Means. Condensed Food as An Alimentary Element—Historical Notes as to the Progress of the Art—Extent of Its Application in Domestic Economy.” *The New York Times*, April 24, 1870.
- Chittenden, Russel H. *The Nutrition of Man*. New York: Frederick A. Stokes Company, 1907.
- Combs, Gerald F. “Celebration of the Past: Nutrition at USDA.” *The Journal of Nutrition* 124 (1994): 1728S–32S.

- Cordain, Loren, S. Boyd Eaton, Anthony Sebastian, Neil Mann, Staffan Lindeberg, Bruce A. Watkins, James H. O'Keefe, and Janette Brand-Miller. "Origins and evolution of the Western diet: health implications for the 21st century." *The American Journal of Clinical Nutrition* 81 (2005): 341–54.
- Darby, William J. "Contributions of Atwater and USDA to Knowledge of Nutrient Requirements." *The Journal of Nutrition* 124 (1994): 1733S–7S.
- "diet, *n.*" *The Oxford English Dictionary*. 2nd ed. London: Oxford University Press, 1989.
- "diet, *v.*" *The Oxford English Dictionary*. 2nd ed. London: Oxford University Press, 1989.
- "Dietary Guidelines for Americans" (United States Department of Agriculture, March 03, 2010). <http://www.cnpp.usda.gov/DietaryGuidelines.htm> (March 17, 2010).
- "Dietary Supplements: Safe, Beneficial and Regulated" (Council for Responsible Nutrition). <http://www.crnusa.org/CRNRegQandA.html> (March 17, 2010).
- Dunn, Peter M. "James Lind (1716-94) of Edinburgh and the treatment of scurvy." *Archives of Disease in Childhood – Fetal and Neonatal Edition* 76 (1997): F64–5.
- Erwin, Paul F. "Review of John Harvey Kellogg, M.D." *The Journal of American History* 58 (1971): 783–4.
- "Experiments on Human Nutrition." *Science* 25 (1907): 675–6.
- Fee, Elizabeth and Theodore M. Brown. "John Harvey Kellogg, MD: Health Reformer and Antismoking Crusader." *American Journal of Public Health* 92 (2002): 935.
- "Food Test In This City of Use to Whole Nation." *The New York Times*, January 27, 1918.
- Foster-Powell, Kaye, Susanna H. A. Holt, and Janette C. Brand-Miller. "International table of glycemic index and glycemic load values: 2002." *The American Journal of Clinical Nutrition* 76 (2002): 5–56.
- "Franklin Lectures." *The New York Times*, February 15, 1853.
- Funk, Casimir. "On the chemical nature of the substance which cures polyneuritis in birds induced by a diet of polished rice." *The Journal of Physiology* 43 (1911): 395–400.
- Funk, Casimir. "The preparation of yeast and certain foodstuffs of the substance the deficiency of which in diet occasions polyneuritis in birds." *The Journal of Physiology* 45 (1912): 75–81.
- Harper, A. and A. Astrup. "Can we advise our obese patients to follow the Atkins diet?" *Obesity Reviews* 5 (2004): 93–4.

“Health From a Scientific Diet.” *The New York Times*, May 3, 1908.

“Health Matters.” *Science* 15 (1890): 56.

Jenkins, David J. A., Thomas M. S. Wolever, Rodney H. Taylor, Helen Barker, Hashmein Fielden, Janet M. Baldwin, Allen C. Bowling, Hillary C. Newman, Alexandra L. Jenkins, and David V. Goff. “Glycemic index of foods: a physiological basis for carbohydrate exchange.” *The American Journal of Clinical Nutrition* 34 (1981): 362–6.

Jones, W. H. S., trans. *Hippocrates, with an English Translation by W. H. S. Jones*. London: Heinemann, 1931.

“Leading Causes of Death, 1900–1998.” Centers for Disease Control and Prevention. http://www.cdc.gov/nchs/data/dvs/lead1900_98.pdf (February 22, 2010).

Lewis, Howard B. “Russell Henry Chittenden: (1856–1943).” *The Journal of Biological Chemistry* 153 (1944): 339–42.

“M. Liebig on the Source of Animal Heat.” *Provincial Medical Journal and Retrospect of the Medical Sciences* 4 (1842): 488–9.

McCollum, Elmer V. *A History of Nutrition; the Sequence of Ideas in Nutrition Investigations*. Boston: Houghton Mifflin Company, 1957.

“nutrition, *n.*” (OED Online, September 2009), <http://dictionary.oed.com/cgi/entry/00328677> (March 18, 2010).

Ornish, Dean. “Was Dr. Atkins Right?” *Journal of the American Dietetic Association* 104 (2004): 537–42.

“Parsimony in Nutrition. Sir James Crichton-Brown Takes Issue With Fletcherism.” *The New York Times*, August 23, 1908.

Patrick Manson, E. R. Rost, L. W. Sambon, Ronald Ross, C. W. Daniels, James Cantlie, W. T. Prout, P. A. Nightingale, and Wm. Kynsey. “A Discussion On Beri-Beri.” *The British Medical Journal*. 2 (1902): 830.

Pennington, Jean A. T. “History of *Bowes & Church’s Food Values of Portions Commonly Used*.” *Nutrition Today* 44 (2009): 250–9.

Pollan, Michael. *The Omnivore’s Dilemma: A Natural History of Four Meals*. New York: Penguin Books, 2006.

Pollan, Michael. “Unhappy Meals.” *The New York Times Magazine*, January 28, 2007, 38–68.

- Prout, William. "On the Ultimate Composition of Simple Alimentary Substances; with Some Preliminary Remarks on the Analysis of Organized Bodies in General." *Philosophical Transactions of the Royal Society of London* 117 (1827): 355–88.
- "Radical New Method of Treating Diabetes." *The New York Times*, February 13, 1916.
- "Rice and Beri-Beri." *The British Medical Journal* 2 (1898): 914–5.
- Rosenfeld, Louis. "Vitamine—vitamin. The early years of discovery." *Clinical Chemistry* 43 (1997): 680–5.
- Rosenfeld, Louis. "William Prout: Early 19th Century Physician-Chemist." *Clinical Chemistry* 49 (2003): 699–705.
- Routh, C.H.F. "On the Nature of Food; With Some Remarks on the Varieties of Aliments to Be Supplied to the Army or Navy." *London Journal of Medicine*, 4 (1852): 516–43.
- Schwartz, Hillel. *Never Satisfied*. New York: The Free Press, 1986.
- "Science Measures the Energy Stored in Various Foods." *The New York Times*, June 26, 1910.
- "Scientific Principles of Vegetarianism." *The New York Times*, September 3, 1876.
- Sherman, H. C., C.-E. A. Winslow, E. L. Fisk, I. Greenwald, and T. P. B. Jones. "The Present Status of Our Knowledge of the Vitamins and Its Application to the Dietary." *The American Journal of Public Health* 12 (1922): 908–15.
- Shyrock, Richard H. "Sylvester Graham and the Popular Health Movement, 1830-1870." *The Mississippi Valley Historical Review* 18 (1931): 172–83.
- Singer, P. N., trans. *Galen: Selected Works*. Oxford: Oxford University Press, 1997.
- "Title IV. Prevention of Chronic Disease and Improving Public Health" (The White House). <http://www.whitehouse.gov/health-care-meeting/proposal/titleiv/nutrition> (March 18, 2010).
- Thorne, Van Buren. "A New Weapon in the War Against Disease." *The New York Times*, March 27, 1921.
- Taubes, Gary. "What if It's All Been a Big Fat Lie?" *The New York Times*, July 7, 2002, E22–36.
- U.S. Department of Agriculture. Agricultural Research Administration. Bureau of Human Nutrition and Home Economics. *National Food Guide*. Washington, DC: Government Printing Office, 1946.

- U.S. Department of Agriculture. Economic Research Service. Food and Rural Economics Division. *America's Eating Habits: Changes and Consequences*, Elizabeth Frazao, ed. Agriculture Information Bulletin No. (AIB750). Washington, DC: Government Printing Office, 1999.
- U.S. Department of Agriculture. *Foods: Nutritive Value and Cost*, by W. O. Atwater. Farmers' Bulletin No. 23. Washington, DC: Government Printing Office, 1894.
- U.S. Department of Health, Education, and Welfare. Public Health Service. Office of the Assistant Secretary for Health and Surgeon General. *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention*. Washington, DC: Government Printing Office, 1979.
- U.S. Department of Health and Human Services. Public Health Service. *The Surgeon General's Report on Nutrition and Health*. Washington, DC: Government Printing Office, 1988.
- U.S. Senate. Select Committee on Nutrition and Human Needs. *Dietary Goals for the United States*, 2nd ed. 99th Cong., 1st sess, 1977. Committee Print.
- Vedder, Edward B. "The Relation of Diet to Beriberi and the Present Status of Our Knowledge of the Vitamins." *Journal of the American Medical Association* 67 (1916): 1494–7.
- "Vitamin Theories." *Journal of the American Medical Association* 79 (1922): 381–2.
- "W.O. Atwater Centennial Celebration Symposium: An Evaluation of Progress in Nutrition." *The Journal of Nutrition* 124 (1994): Front matter.
- Welsh, Susan. "Atwater to the Present: Evolution of Nutrition Education." *The Journal of Nutrition* 124 (1994): 1799S–1807S.
- "What and How a Normal Person Should Eat." *The New York Times*, June 9, 1907.
- "What New Yorkers Eat vs What They Should." *The New York Times*, June 2, 1907.
- "What to Eat, and When." *The New York Times*, August 23, 1886.
- Williams, Michael. "We All Eat Too Much." *The New York Times*, May 25, 1907.
- Williams, Susan. *Food in the United States, 1820s–1890*. Westport, Connecticut: Greenwood Press, 2006.
- Whorton, James C. "Historical development of vegetarianism." *The American Journal of Clinical Nutrition* 59 (1994): 1103S–9S.
- Woody, Thomas. *Life and Education in Early Societies*. New York: The Macmillan Company, 1949.