Historical development of vegetarianism[1,2]

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ABSTRACT Vegetarianism pursued for reasons of physical health is a recent practice historically. Before the 19th century, avoidance of animal food was justified with moral and metaphysical arguments. During the early 1800s, however, an intensified desire for improved health combined with the ascendance of science to a position of cultural authority helped to promote the formulation of physiological arguments for vegetarianism. Theories of the nutritional superiority of a vegetable diet were nevertheless shaped by moral convictions, giving vegetarian spokesmen such as Sylvester Graham and John Harvey Kellogg the appearance of being dietary fanatics. Only as nutritional science expanded from the mid-20th century onward did vegetarianism acquire general recognition as a healthful dietary alternative. But because that alternative is still often selected for moral or other nonscientific reasons, nutritional education of vegetarians remains an essential activity. *Am J Clin Nutr* 1994;59(suppl):1103S–9S.

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Introduction

One of the more popular types of word puzzle to be found in American newspapers is the jumble, a puzzle in which one has to return the scrambled letters of several words to their proper order. Certain letters in each restored word must then be rearranged into new words to provide an answer to a picture riddle. In the jumble under consideration, a pith-helmeted man is shown waist deep in a soon-to-be-simmering cauldron, anxiously holding out a book titled *Good Nutrition;* the puzzle caption reads "What the missionary had to convert the cannibals to." The answer, of course, is vegetarianism, but although the text on nutrition suggests that vegetarianism owes its authority to science, the man presenting the text is a missionary, a representative of the church rather than the laboratory. He is attempting to convert his audience, to win them over, by moral persuasion rather than by scientific argument.

The purpose of this conference is to present and discuss scientific findings relating to the value of vegetarian nutrition. In doing this, we are continuing a tradition that extends back nearly two centuries (1). When, for example, the American Vegetarian Society was founded in 1850, the very first resolution adopted by its membership stated "that comparative anatomy, human physiology, and . . . chemical analysis . . . unitedly proclaim the position, that not only the human race may, but *should* subsist upon the products of the vegetable kingdom." There was an essential difference between that conference and the Second International Congress on Vegetarian Nutrition however, in that the second resolution passed in 1850 declared "that the Vegetarian principle of diet derives its most ancient authority from the appointment of the Creator to man" in the Garden of Eden. The next two resolutions similarly claimed biblical, as well as moral, sanctions for vegetarian diet (2, p 6). Many of us would agree that there are indeed valid moral, and perhaps religious, arguments to be made in support of vegetarianism. We would nevertheless take pains to keep morality separate and distinct from physiology and to not allow sentiment to dictate science. Historically, vegetarians have not been so careful. For most of the past two centuries, in fact, their pronouncements of the nutritional superiority of a fleshless diet have been based less on independent science than on adaptations of science directed by the faith that what is right morally must of necessity be right physically. Like the missionary in the jumble, vegetarians have treated good nutrition more as a gospel than as a text and have striven to convert dietary heathen as much by preaching as by teaching. This zealous fusion of moralism with nutrition unfortunately has given vegetarianism the reputation of fanaticism and thus retarded objective evaluation and recognition by mainstream nutritional science.

Vegetarianism and morality

The subordination of science to morality began in the early 1800s. Before that time, vegetarian philosophers had barely noticed science, their attention being focused instead on the morality and metaphysics of diet. Ancient writers such as Ovid and Plutarch deplored the killing of innocent creatures for food; others, most notably Pythagoras and Porphyry, argued that the flesh of beasts contaminated and brutalized the human soul. The goal of vegetarianism had thus been the achievement of an exalted spiritual state "beyond the smoke and the waves of the corporeal nature," to use Porphyry's words (3, p 53).

But if dietary puritans hoped to rise above their corporeal natures, few imagined they could abandon or ignore it. Vegetarians generally held to a holistic view of life in which the health of the spirit was dependent on the health of the body; spiritual innocence required physical purity. According to the 17th-century

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English vegetarian Thomas Tryon, "by thoroughly cleansing the outward court of terrestrial nature, it opens the windows of the inward senses of the soul" (4, p 54). Physical well-being—nutrition—was thus an implicit concern of vegetarian moralists and occasionally it was given explicit statement. Tryon, for example, justified vegetarian diet primarily with biblical references (that it was the original diet prescribed by God, in Genesis 1:29) and moral objections to the cruel exploitation of "fellow creatures." But he took the trouble to add that flesh was inferior nutriment too, being "not of so firm a substance, nor so good" as plant food. His proof was that meat decomposes more readily than fruit and vegetables, and " 'tis certain, such sorts of Food as are subject to putrifie before they are eaten, are also liable to the same afterwards. . . . *Flesh* does breed great store of noxious Humours" (5, pp 376–7).

The proposition that because meat rots so quickly outside the body it will incite internal putrefaction if taken into the body was the most solid argument for the nutritional superiority of vegetarianism offered before the 20th century. Although the quality of the nutritional science supporting vegetarianism long remained dubious, the quantity of scientific arguments—and their significance in vegetarian apologetics—increased dramatically during the 19th century. This emergence of a would-be scientific, as distinct from philosophical, vegetarianism was a reflection of two developments of the late 18th century: the ascendance of science to a position of authority in European culture and a dramatic spurt in popular awareness (even acceptance) of vegetarianism. The latter phenomenon was a product of the increasingly humane attitude toward animal life that characterized the Romantic era, particularly in England. An intensified abhorrence of pain, coupled with evangelical religion's social gospel of sympathy for the downtrodden and exploited, fueled an animal protectionist campaign in Britain that attacked the abuse of work animals, the practice of vivisection experiments, and the slaughter of animals for food. Vegetarian publications grew apace, no longer the occasional volume of an isolated eccentric, but now a middling-sized genre attracting devoted practitioners. Vegetarians began to organize, flocking first to the Bible Christian Church founded by the so fittingly named Manchester minister William Cowherd. This new vegetarianism was fundamentally a moral reaction. The title of the first major work to come out of this movement expressed its motivating tenet: *The Cry of Nature, or, An Appeal to Mercy and to Justice, on Behalf of the Persecuted Animals* by John Oswald. Romantic sentiment gushed through such volumes; Oswald's frontispiece, for example, portrays a slaughtered fawn spilling its blood on the earth while its hovering mother tearfully calls on it to rise. Nearby an unclothed child of nature hides her face in shame. "Come," Oswald invited, "approach and examine with attention this dead body. It was late a playful fawn, which, skipping and bounding . . . awoke, in the soul of the feeling observer, a thousand tender emotions. But the butcher's knife hath laid low the delight of a fond dam, and the darling of nature is now stretched in gore upon the ground. Approach, I say, . . . and tell me, tell me, does this ghastly spectacle whet your appetite? Delights your eyes the sight of blood? Is the steam of gore grateful to your nostrils, or pleasing to the touch, the icy ribs of death? . . . or with a species of rhetoric, pitiful as it is perverse, will you still persist in your endeavour to persuade us, that to murder an innocent animal, is not cruel nor unjust; and that to feed upon a corpse, is neither filthy nor unfit?" (6, pp 22–3).

Vegetarianism and nutrition

Filthy and unfit are moral terms, of course, but they have physiological connotations as well. What one sees here, and expressed still more overtly in subsequent vegetarian literature, is the suggestion that the revulsion produced by the sight of blood and the smell of gore is not simply an aesthetic reaction; it is also a physiological response to physical filth and physical unfitness, an indication that the human body is not designed to receive such food as nutriment.

The 18th-century Enlightenment elevated science to an indispensable method of investigation and proof. For the newly energized vegetarianism of the early 19th century to be legitimized in society's eyes, therefore, it had to prove itself nutritionally as well as spiritually. This was actually a two-step process, the first being to demonstrate that human beings could in fact live in health without consuming meat. It was generally assumed that meat, being most closely akin chemically to human muscle, must be more easily digested and assimilated and provide greater strength and endurance than vegetable food. An all-vegetable diet, this reasoning supposed, must be debilitating. Evidence to the contrary was presented early in the 1800s, however, by London physician William Lambe. (The founders of modern vegetarianism might have been named by Charles Dickens; in addition to Lambe and Cowherd, the latter's envoy to America was named William Metcalfe.) In 1806, Lambe cured himself of long-standing illness by removing meat from his diet and then proceeded to cure others by the same method. His experiences, reported in 1815 in a widely circulated book, convinced him that people could live every bit as healthfully on an all-vegetable diet as on a mixed diet (7).

The second step in the nutritional validation of vegetarianism was to prove that humans live more healthfully on a diet free of flesh. Hints to that effect had been offered all along and became more frequent in the early 1800s. Lambe accompanied his observation that meat is unnecessary with the proposal "that what is not necessary cannot be natural . . . and . . . what is not natural cannot be useful" (7, p 172). Similarly, when Shelley converted to vegetarianism, his impassioned *Vindication of Natural Diet,* published in 1813, bolstered moral arguments with assertions of physical improvement. The poet concluded his book with a classically Romantic illustration of the health benefits of a vegetable diet. Among other improvements, Shelley explained, the vegetarian "will acquire an easiness of breathing . . . with a remarkable exemption from that powerful and difficult panting now felt by almost everyone after hastily climbing an ordinary mountain" (8, p 27).

Sylvester Graham

Realistically, though, the uphill battle was fought by vegetarians. Shelley notwithstanding, the overwhelming force of medical belief was on the side of a flesh diet (Lambe lamented that the contempt shown his ideas by most doctors was "immeasurable") (9, p 285). The orthodox position of the benefits of a flesh diet, however, eventually came under attack most vigorously in the United States, where a crusade to elevate the health of the American public took a vegetable diet as its cardinal principle. The popular health reform movement, as this campaign of the 1830s and 1840s was known, was launched by a Presbyterian minister and temperance lecturer named Sylvester Graham. A

rather frail and nervous specimen himself, Graham nevertheless presumed to dictate the rules of healthful living to everyone else with harangues from the lecture podium, in journal articles, and, most impressively, in his two-volume *Lectures on the Science of Human Life* (1839). The science of his lectures was not, however, the straightforward physiology he claimed it to be. Rather, it was a Christianized science in which the laws of health were treated as a physical counterpart to the Ten Commandments. And because both sets of rules had been authored by God, and the infinitely wise Deity would never contradict Himself, the realm of physiology had to be always in agreement with the realm of morality. Such thinking had been used already in the temperance movement's assault on "demon rum," in which unsubstantiated charges of physical injuries caused by even moderate drinking clearly were inspired by outrage at the brawling, wife abuse, child neglect, and similar immorality associated with excessive drinking. Graham simply applied the rule that physiology is congruent with morality to all other areas of health behavior—drink and diet, exercise and rest, cleanliness and dress, and even (indeed especially) sex. Thus, evenings spent at the theater or the ballroom were condemned because indoor crowds depleted the air of life-giving oxygen and replaced it with carbon dioxide and other impurities, although equally crowded Sunday morning sermons were left unmentioned. Sexual indulgence of any sort was branded as potentially debilitating, but lest anyone suppose one orgasm was no more enervating than any other, Graham devised extensive "physiological" arguments to demonstrate that extramarital pleasures were much more dangerous than those received within wedlock. Furthermore, masturbation, morally the most reprehensible of all sexual acts, was also shown to be the most injurious. The fear that self-pollution leads to blindness, idiocy, and virtually every other infirmity can be traced to Graham more than to anyone else (1, pp 3–131).

Yet as exercised as he became over sex, Graham's paramount concern was for diet. It was from food that the body's very substance was derived; construct a body from inferior components, and all the exercise, pure air, and sexual restraint in the world would be of no avail. Two dietary sins in particular stirred Graham's wrath. One was the growing fashion of white bread, a repudiation of the natural, ie, God-made, whole-wheat loaf. Coarse-ground Graham flour, Graham bread, and of course, Graham crackers were his creations designed to restore American society to wholesomeness. He attacked white flour not with the simple objection that it was unnatural, but rather with an argument that because it was a more concentrated food, it must be more stimulating. The concept of stimulation was the link he used to tie physiology to morality. Stimulation was already a charged word morally, for, to the Victorian mind, stimulation of carnal appetites and animal passions was the root of all evil. Graham constructed a parallel system of physiology in which stimulation of tissue was the root of all inflammation and, ultimately, of all disease. Excessive stimulation was the mechanism used to account for the physiological hazards of extramarital sex, alcohol and coffee, even tight pants. It was also the central element of the health reform case against the eating of meat.

Graham hardly labored alone in building this case. Numerous health reformers participated, most notably William Andrus Alcott, who in the late 1830s supplanted Graham as commander of the health reform forces. One of the most prolific self-help writers of the entire 19th century, Alcott contributed an 1838 volume titled *Vegetable Diet,* specifying in his subtitle that vegetarianism was *Sanctioned by Medical Men and by Experience in All Ages;* it was intended, in short, to show that science corroborated morality. Comparative anatomy was one of the sciences applied to the task, the similarity of human teeth and intestines to those of herbivores was pointed out again and again.

The new science of nutrition seemed to offer the most direct route to proof. Any number of nutrition arguments were put forward in the vegetarian publications of the health reform era, but they were nearly all variations on the theme that meat is a stimulant. One effort, for example, interpreted the famous in vivo digestion experiments performed by William Beaumont on a subject with a gastric fistula. Beaumont's studies, conducted throughout the 1820s, included measurement of the digestion times required by various foods. Food samples tied to a string were introduced into the stomach and retrieved for hourly inspections. Beaumont's conclusion was that "generally speaking, vegetable aliment requires more time, and probably greater powers of the gastric organs, than animal" (10, p 36). Graham objected to Beaumont's conclusion, maintaining that speed of digestion is clearly an indication of a more intense response by the vital powers to the stimulus of food. The more intense the response, he explained, the more intense the stimulus must be, so meat must be more stimulating—pathologically stimulating—than vegetables. There was additional evidence in the feeling of warmth experienced after a meal rich in meat. A later generation would attribute this to the specific dynamic action of protein but, for health reformers, it was a "digestive fever" in which, according to Alcott, "The system . . . is inevitably worn into a premature dissolution, by the violent and unnatural heat of an over-stimulated and precipitate circulation" (11, p 221). Meat even stimulated itself (as Tryon had noted two centuries earlier), decomposing in much less time than vegetables.

Logically then, it followed that human flesh constructed from the excessively stimulated molecules of meat must also be less stable and, therefore, more subject to decay. That explained, in Alcott's opinion, why vegetarians smelled better. "The very exhalations of the lungs," he asserted, "are purer, as is obvious from the breath. That of a vegetable-eater is perfectly sweet, while that of a flesh-eater is often as offensive as the smell of a charnel-house. This distinction is discernible even among the brute animals. Those which feed on grass . . . have a breath incomparably sweeter than those which prey on animals. Compare the camel, and horse, and cow, and sheep, and rabbit, with the tiger (if you choose to approach him), the wolf, the dog, the cat and the hawk. One comparison will be sufficient; you will never forget it" (12, pp 233–4). Still more to the point, however, was that the unstable atoms of a meat eater's muscles must be subject to more rapid molecular turnover than a vegetarian's tissues and hence subject to accelerated aging and premature death. The mechanics of life could be summed up simply: "A man may not inaptly be compared with a watch—the *faster it goes the sooner it will run down*" (13, p 291).

This fear of fast living was easily translated into moral language. Alcott immediately followed his alarm over the "violent and unnatural heat" of a flesh eater's digestive fever with the observation that a vegetable diet is cooling and "has a tendency to temper the passions" (11, p 221). Russell Trall, also a medical doctor, was even more uneasy about untempered passions. "There is no delusion on earth so widespread," he warned, than "this, which confuses stimulation with nutrition. It is the very parent source of that awful . . . multitude of errors, which are

leading the nations of the earth into all manner of riotous living, and urging them on in the road to swift destruction. This terrible mistake is the primal cause of all the gluttony, all the drunkenness, all the dissipation, all the debauchery in the world—I had almost said of all the vice and crime also'' (14, p 10). Health reformers' thrilling flights of theory were balanced, to their credit, with down-to-earth case demonstrations. The proof of the theory was in the state of health of those who practiced vegetarianism, and history could offer robust vegetarians aplenty. The first to be recognized, predictably, were antediluvian people, those original folk whose simple diet kept them vigorous all the way to the end of their 900 y. ''Can we suppose,'' it was asked, ''that the delicate hands of Eve took the quivering flesh of the young fawn, and prepared it for the coals, . . . then sat down and chewed it as a sweet morsel between her teeth? Can we suppose she talked of nausea, of headaches, of a palpitating heart, or agitated nerves?'' (1, p 87).

Pagans could serve the cause as well, although surprisingly it was pagan soldiers who were held up as paragons of hygiene, especially those of the Roman army, who had marched to their greatest victories on plain vegetable rations. The incongruity of the diet of gentleness and benevolence providing the strength for battlefield slaughter was missed by the health reformers in their excitement over the physical glory of the vegetarians of antiquity. Subsistence on vegetable food, according to an agitated Graham, was ''true of all those ancient armies whose success depended more on bodily strength and personal prowess, in wielding war-clubs and grappling man with man in the fierce exercise of muscular power, and dashing each other furiously to the earth, mangled and crushed and killed'' (15, p 188). More recent and less brutal examples proved to be more convincing and suitable. Alcott allotted nearly 200 pages of his book on vegetable diet to the presentation of testimonials, including some cases of prodigious vitality. The amazing Amos Townsend, for example, was a graminivorous bank cashier who could ''dictate a letter, count money, and hold conversation with an individual, all at the same time, with no embarrassment'' (12, pp 75–6).

There was embarrassment, however, for Graham, because despite his diet, he suffered years of invalidism and died prematurely in 1851 at the age of 56 y. However, by the time of Graham's death, the American Vegetarian Society had held its inaugural convention and its British counterpart, The Vegetarian Society, had been in existence for 4 y (16; 17, pp 22–36). The Vegetarian Society in fact, coined the term ''vegetarian'' at its inaugural meeting—and immediately attracted ridicule (18, p 6). The magazine *Punch* reported that ''a prize is to be given [by the Society] for the quickest demolition of the largest quantity of turnips; and a silver medal will be awarded to the vegetarian who will dispose of one hundred heads of celery with the utmost celerity'' (19). What did spread with celerity was an organized movement of vegetarianism; by the 1860s, vegetarian literature and societies were also commonplace on the continent, although England and the United States remained in the leadership positions (20).

In both England and the United States vegetarianism became intimately affiliated with an alternative medical movement that was subsuming Graham's health reform message. Hydropathy was a system of healing that relied on cold water baths and showers to cure all complaints (21, 22). Launched in Austria in the 1820s, it spread to Britain and the United States during the 1840s. In its original form, it relied on exercise to enhance the effects of water on elimination of impurities from the body. Particularly in America, however, hydropathic practice was expanded to embrace all elements of healthful living, including diet. The leading figure in American hydropathy was Russell Trall, who was also a founding member and officer of the American Vegetarian Society and the author of a volume titled *The Scientific Basis of Vegetarianism.* Under the rubric of what Trall called ''hygeiotherapy'' (healing and health maintenance through hygiene), the practice of vegetarianism was sustained and transmitted to the later 19th century.

John Harvey Kellogg

The scientific or nutritional basis of vegetarianism did not change significantly under Trall's stewardship, however. It was one of his students who brought the vegetarian message more forcefully to public attention with the development of an updated scientific rationale. As a young man, John Harvey Kellogg was a Seventh-day Adventist and a friend of Adventist spiritual director Ellen White. A convert to vegetarianism after discovering the works of Graham at the age of 14 y, Kellogg received a degree in hydropathic medicine at Trall's Hygeio-Therapeutic College, as well as a degree in orthodox medicine. Returning to Adventist headquarters in Battle Creek, MI in the mid-1870s, Kellogg assumed control of the then struggling Western Health Reform Institute, a hospital and health education facility operated by the church. He not only transformed the Battle Creek Sanitarium, as it was soon known, into a thriving business, he established it as the most famous health institution in the country from the 1870s until World War II. As part of the Sanitarium's dietary program, Kellogg, assisted by his brother Will, created an assortment of meat substitutes and other vegetarian health foods, including the breakfast cereals that have immortalized the family name (1, pp 201–38; 23).

Kellogg also lectured tirelessly from coast to coast and wrote voluminously. In addition to editing the popular periodical *Good Health,* he authored several dozen books, addressing every aspect of personal health behavior from *The Evils of Fashionable Dress* to *Plain Facts About Sexual Life* to *Colon Hygiene.* The last topic, the health of the large bowel, represented Kellogg's most significant contribution to the nutritional argument for vegetarianism. Here he elaborated on the dietary implications of one of the grand pathology fads of the turn of this century—intestinal autointoxication. In the 1880s, laboratory scientists had isolated several substances produced in the intestinal tract through the bacterial putrefaction of undigested protein. The compounds were determined to be toxic when injected directly into the bloodstream in animals and it was quickly supposed they might be absorbed from the colon into the human bloodstream and then circulate to play havoc throughout the body. Because these self-poisoning agents were products of bacterial activity, the theory of autointoxication could be seen as an extension of medical bacteriology. Thus, clutching the coattails of the germ theory, autointoxication swept into professional and popular awareness at the end of the 19th century (24, 25).

For Kellogg, the autointoxication theory provided enough ammunition to support three book-length attacks on meat eating. In *Colon Hygiene, Autointoxication,* and *The Itinerary of a Breakfast,* he elaborated time and again on how the common diet contained so much protein from flesh components that it encouraged

the growth and activity of proteolytic bacteria in the colon. As the microbes operated on undigested flesh food, the body would be "flooded with the most horrible and loathsome poisons," producing headaches, depression, skin problems, chronic fatigue, damage to the liver, kidneys, and blood vessels, and other injuries adding up to "enormous mischief." Anyone who read to the end of Kellogg's baleful list must have been ready to agree that "the marvel is not that human life is so short and so full of miseries, mental, moral, and physical, but that civilized human beings are able to live at all" (26, p 131).

Kellogg used "civilized" to refer to the fiber content of the ordinary diet too. Modern people, he chided, ate too concentrated a diet with insufficient bulk and roughage to stimulate the bowels to action. A vegetarian diet, he added for the unaware, was high in roughage. Its other advantage was that it was low in protein. The high-protein diet of flesh eaters was ideal fodder for the putrefactive microorganisms of the colon whereas the diet's low fiber content reduced its rate of movement through the intestines to a crawl that gave the microbes time to convert all unabsorbed protein to poisons. In the meat eater's sluggish bowels, Kellogg believed, lay "the secret of nine-tenths of all the chronic ills from which civilized human beings suffer," including "national inefficiency and physical unpreparedness," as well as "not a small part of our moral and social maladies" (27, pp 87, 93). Again, morality was equated with physiology. A contemporary of Kellogg's carried the question to its limits: "This condition of food intoxication may lead to acts of violence or immorality, at the memory of which the perpetrator looks in horror and amazement. The diner leaves the table intoxicated with a dozen poisons. A heated argument, a word too much, a moment of frenzy, a sudden blow; and the next morning he awakens to find himself a criminal. Or a hand is laid on his arm, a voice whispers in his ear; and he turns aside to follow the scarlet woman—the scarlet woman whose steps lead down to hell" (28, p 68).

Kellogg presented a different merger of morality with bacteriology in his vegetarian work *Shall We Slay to Eat?* It was published a year before Upton Sinclair's *The Jungle,* a far more famous exposé of insanitary conditions in meat packing plants. Kellogg's book first forced readers to confront the immorality of the slaughterhouse and then addressed the physical dangers of meat. Kellogg wrote of the gentleness of unoffending livestock, creatures with whom humans were bound by evolution, followed by stark descriptions of the butchering process and of the squealing and bleating of the dying animals. Blood-drenched prose described the "tide of gore," the "quivering flesh," the "writhing entrails" (29, pp 145–67). Ultimately, however, Kellogg counted on the abominable filth through which the tide of gore flowed to move his readers. The Augean nastiness of the typical abattoir guaranteed that meat would be infested with every germ known. "Each juicy morsel" of meat, Kellogg disclosed, "is fairly alive and swarming with the identical micro-organisms found in a dead rat in a closet or the putrefying carcass of a cow" (30, p 107). Kellogg asserted that Methusaleh would never have become a byword for longevity if the earliest humans had eaten such stuff. He wrote of Methusaleh in the poem *Methusaleh's Meat:*

"No fish was he fed,
No blood did he shed.
And he knew when he had eaten enough.
And so it is plain
He'd no cause to complain
Of steaks that were measly or tough.
Or bearded beef grimy,
Green, moldy, and slimy,
Of cold-storage turkeys and putrid beefsteaks,
With millions of colon germs,
Hams full of trichina worms,
And sausages writhing with rheumatiz-aches.
Old Methusaleh dined
On ambrosia and wined
On crystal pure water from heaven-filled springs.
Flesh foods he eschewed,
Because, being shrewd,
He chose Paradise fare and not packing-house things. (23, p 40).

Alexander Haig

The new scientific basis of early 20th-century vegetarianism was hardly limited to germ contamination and autointoxication. More than one defender drew on the theory of evolution to argue that a being related to apes should subsist on a simian diet. In addition, biochemistry was used; London physician Alexander Haig rejected meat because it supplies uric acid to the body. In the 1880s, Haig convinced himself through a process too involved to be detailed here, that his migraine attacks were due to "uricacidemia"—excess uric acid in his blood. As often happens when an enthusiast discovers the source of his own health problems, Haig was soon blaming uric acid for everybody's problems. Through a selective use of biochemical data and oversimplified biochemical theory, Haig proposed mechanisms by which uric acid could cause any complaint from flatulence to cancer. He presented his thesis in a 900-page opus called *Uric Acid as a Factor in the Causation of Disease,* of which seven editions were published in the 1890s and early 1900s. Haig's notions were soon disowned by his medical brethren, but the public's fear of uric acid lasted into the 1920s and brought greater popular attention to bear on vegetarianism. It was not necessarily approving attention, though, because the "uric-acid-free diet" that Haig recommended was highly restrictive. It required the elimination of every food containing either uric acid or purines that could be metabolized into uric acid. This rule eliminated not only all meat, but also many vegetables (eg, beans, peas, asparagus, and mushrooms), and whole-grain cereal products. Haig was thus left to consume milk, cheese, some vegetables, fruit, nuts and—a unique position for a food reformer—white bread. Additional blandness was imposed by the prohibition of coffee and tea on the grounds that they contained methyl xanthines (although scientists later determined that caffeine and similar compounds are not metabolized into uric acid). Any rejoicing that at least alcoholic beverages were free of uric acid–producing substances was quickly squelched by Haig's promise that his diet removed any need for stimulation and thus destroyed the taste for strong drink (1, pp 239–59).

Haig believed that there were two ways that uric acid–free vegetarianism strengthened a person's moral fiber: by destroying the craving for alcohol and by improving circulation to the brain, thereby enabling clearer thought and more forceful will power. Uric acid, Haig believed, was behind every social evil from the decline of family values to the erosion of Britain's imperial standing. His diet, therefore, was the key to a brighter future, one

"which will be . . . truer, nobler and better, as man slowly realizes how much of his sordid past has had its origin in unnatural food" (31, p viii).

The physical advantage of Haig's diet was demonstrated by the extraordinary success of several athletes who adopted it. Indeed, as early 20th-century society became captivated by competitive sports, vegetarians of every persuasion (uric-acid-free, vegan, lactoovovegetarian, and fruitarian) turned to athletic conquest for practical proof of the nutritiousness of their regimen. There is indeed a remarkable record of vegetarian victories in all sports in the 1890s and early 1900s, from the cycling records of England's aptly named James Parsley, to the unblemished record achieved by the tug-of-war team of the unfortunately named West Ham Vegetarian Society. Carnivore competitors, however, credited vegetarians' triumphs not to their diet, but to fanaticism (32).

Newer nutrition of the 1920s

Although full-fledged vegetarianism was still being taken lightly in the early 20th century, this time period did foster a new respect for the nutritional value of vegetables. Few people accepted vegetable foods as being wholly sufficient for a healthful diet but almost all realized that eating more vegetables was necessary for good health. The critical development that led to this new outlook was the growth of understanding of vitamins that took place over the first two decades of the century, accompanied by the realization that vitamin-rich fruits and vegetables were badly neglected at most tables. The most prominent representative of the so-called "newer nutrition," vitamin discoverer Elmer McCollum, estimated in 1923 that "at least 90 per cent" of the food eaten by most American families was restricted to the old standards of white bread and butter, meat, potatoes, sugar, and coffee. His call for nationwide "dietary reform" was aimed at educating and converting the public to replace much of the traditional diet with what he called "protective foods" (33, pp 234–5). The resultant dietary education campaign made the 1920s as much a decade of newer nutrition as of bathtub gin and jazz. Food educators bombarded the public through lectures, newspapers, magazines, textbooks, and comic strips and were gratified to see national consumption of fruits and vegetables increase markedly. (To note one of the more extraordinary examples, between 1925 and 1927 the spinach intake of schoolchildren in Fargo, ND grew 10-fold (34, 35).

Public consciousness of the nutritional virtues of plant foods was not limited to vitamin awareness. Another dominant health theme of the 1920s was the lack of fiber in modern society's diet of refined and processed foods. Thus, a 1928 advertisement for Bran Flakes (Post, Battle Creek, MI) placed a 10-ft tall menu card in the dock, flanked by burly policemen: "Indicted!" the ad blared. "The menu is charged with being responsible for a high percentage of ill health due to a definite lack of bulk food" (36). Bran and other bulk foods were required, of course, to prevent constipation, and ultimately, autointoxication, still an unsettling threat in the public mind. Recommendations for vegetable food because of its roughage were not issued just by manufacturers with an obvious economic motivation. A basis of objectivity was provided by altruistic health reformers, some of them physicians and scientists. At the head of this group was Britain's archenemy to autointoxication, the renowned surgeon Sir William Arbuthnot Lane. Convinced that the upright posture and soft lifestyle of civilized people weakened the colon and produced "chronic intestinal stasis," Lane surgically removed hundreds of patients' colons during the 1910s to save them from autointoxication. The risks of surgery, as well as criticism from his professional colleagues, forced Lane to stop doing colectomies in the 1920s. But he remained convinced that constipation was the fundamental disease of civilization and was responsible for a host of illnesses, including colon cancer and other neoplasms. In 1926 he organized the New Health Society in London and dedicated the last 17 y of his life to lecturing and writing on the dangers of intestinal stasis. Through Lane and his New Health Society comrades, English—and American—consumers were repeatedly reminded of the importance of fruits and vegetables for maintaining bowel regularity and preventing more serious diseases (24).

Recent developments

Frequently included in Lane's presentations were anecdotal reports of vegetarian populations in less-developed nations who were relatively free from autointoxication diseases. Since the 1960s, these anecdotes have been improved on as more and more extensive epidemiological studies link high fiber intake with low incidences of hemorrhoids, gallstones, colon cancer, and various other "Western diseases" (37). The dietary fiber hypothesis has sparked a good bit of discussion as well as controversy among nutritionists and other health scientists, but the general public has clearly been impressed with the health benefits of a diet high in unrefined vegetable foods. Publicity given to cholesterol and saturated fats has similarly conditioned society to associate vegetarianism with health and has motivated nutritionists to study the health of vegetarian groups such as Seventh-day Adventists and Trappist monks (38). Such studies, conducted from the 1950s onward, have largely confirmed what early 19th-century vegetarians initially proposed: first, that vegetable diet can sustain health, and second, that it can improve health.

At the same time the growth of vegetarianism in recent years has been encouraged by metaphysical, moral, and social currents too. Exposure to Eastern mysticism has persuaded many that Porphyry was right: meat must be abandoned to attain spiritual harmony and inner peace. The endangerment of whole species in the modern world has intensified disgust with human exploitation of other animals. Environmental pollution and destruction of ecosystems by rampant heedless development have rekindled a desire to return to preindustrial simplicity, including simple ways of diet. The economic and environmental costs of sustaining an ever-growing population on flesh food have made vegetarianism seem essential to the rescuing of spaceship Earth. So even as the scientific foundation for vegetarian nutrition expands and solidifies, converts come into the fold for reasons additional to physical health and too often lack a sound understanding of nutritional principles (Zen macrobiotic dieters in particular have become notorious for self-injury) (39).

The history of vegetarianism is of considerable interest for its own sake, regardless of any applications it might have to the practical questions of the present. History does offer a modest moral nonetheless: by demonstrating the difficulty of separating science from sentiment in questions of humane diet, history validates the concern of modern-day nutritionists that the moral fervor that has long activated so many vegetarians has to be in-

formed by cool-headed science. If the vegetarian missionary is to be kept out of hot water, he has to read and understand that text of good nutrition himself and not just brandish it before his detractors.

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