

In Defense of the Vegan Ideal: Rhetoric and Bias in the Nutrition Literature

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Abstract *Much of the scientific literature on vegetarian nutrition leaves one with the impression that vegan diets are significantly more risky than omnivorous ones, especially for individuals with high metabolic demands (such as pregnant or lactating women and children). But nutrition researchers have tended to skew their study populations toward "new vegetarians," members of religious sects with especially restrictive diets and tendencies to eschew fortified foods and medical care, and these are arguably the last people we would expect to thrive on vegan diets. Researchers also have some tendency to play up weakly confirmed risks of vegan diets vis-à-vis equally weakly confirmed benefits. And, in spite of these methodological and rhetorical biases, for every nutrient which vegans are warned to be cognizant of, there is reason to believe that they are not at significantly greater risk of nutritional deficiency than omnivores.*

Keywords: vegetarian diet, nutrition, animal rights.

I. Introduction

In a series of recent papers,¹ Kathryn Paxton George has argued that, in light of nutritional evidence, it would be unjust to require vegetarianism of (among others) women, children, and the poor and "undereducated," because individuals from these groups would face significantly higher risks of malnutrition. From this she concludes that arguments for ethical vegetarianism (particularly for veganism) relegate women and others to a moral underclass, by taking the male (and probably affluent, white) body as the paradigm, and "excusing" those whose different nutritional requirements make it impossible for them to thrive on a vegetarian (and especially vegan) diet from living up to the moral ideal.

In this paper, I focus primarily on the empirical underpinnings of George's view. For George writes as if the available nutrition research clearly and

unambiguously confirms her claims about the risks involved in vegetarian and especially vegan diets *vis-à-vis* omnivorous ones. It is on this ground that she claims that arguments for ethical vegetarianism are, in effect, setting up the male body as a paradigm by setting up vegetarianism (especially veganism) as a moral ideal: it is because women and children are less likely to thrive on vegetarian diets that they are to be “excused” from the dietary ideal.

Before proceeding, it is important to be clear about what exactly is being claimed by someone who argues as George does. The claim cannot be simply that risks accompany a vegetarian diet. First, where risk is identified with probability of a harmful outcome, every conceivable diet involves some risk, so showing that risks are involved does not distinguish vegetarian diets from any other conceivable diets.²

Second, and more fundamentally, a very small probability of causing a very bad outcome does not weaken the duty to perform an action which will in the vast majority of cases have a positive outcome. Almost anything can backfire. Taking a child to the doctor occasionally results in the child’s death—accidents happen both en route and in the doctor’s office—but that does not lessen the obligation to take one’s children to the doctor. Similarly, showing that a bad outcome is slightly more likely following one means of fulfilling a duty does not show that one has a duty to use the less risky means if the difference in risks is sufficiently small. Going to the doctor in the family’s midsize car is slightly less likely to result in injury to the child than is going in the family’s subcompact, because if there is an accident en route, injury is less likely in a midsize car. But surely this does not imply that the child must never be taken in the family’s subcompact.

It is, of course, impossible to specify precisely how great the difference in risks must be before we conclude that the duty is weakened or eliminated. Clearly, however, the relevant question is not, “Does a vegetarian diet pose any risks to one’s health?” but rather, “Is the risk posed by a vegetarian diet *significantly greater* than that posed by an omnivorous one?”

In what follows, I examine the scientific literature on vegan diets, which excludes not only meats (including poultry and fish), but animal by-products like eggs and dairy products. My conclusion is that the literature provides no clear support for an affirmative answer to the latter question. For each of the specific nutrients vegans are cautioned to be cognizant of, there is good reason for thinking that they are *not* at significantly higher risk of deficiency than are omnivores. There are also subtle methodological and rhetorical biases in the literature.

II. Women on Vegan Diets

In light of our species’ phylogeny—the switch to agriculture from hunting and gathering occurred only 10,000–12,000 years ago, a mere wink in evolutionary time—it is not unreasonable to suspect that human beings would have trouble flourishing without consuming at least some foods of animal origin. And in light of the physiological needs associated with pregnancy, lactation, and menstruation, it is not unreasonable to suspect that this would be particularly difficult for women.

The nutrients vegans are usually cautioned to be cognizant of are calcium, folic acid, iron, zinc, and vitamins B₆, B₁₂, and D. However, according to nutritionist Johanna T. Dwyer, a leading researcher on and (I think it fair to say, for the reasons given below) critic of vegan diets, folic acid, zinc, and vitamin B₆ deficiencies are rare even among vegans.³ I will, therefore, concentrate on calcium, iron, and vitamins B₁₂ and D.

Vitamin B₁₂

Vitamin B₁₂ deficiencies develop very slowly, because minute amounts are needed and the body stores a thousand times that amount. The effects are dramatic, however, including in advanced cases irreversible degeneration of the peripheral nervous system. This vitamin is not produced by either yeasts, plants or animals, but only by various bacteria, fungi, and algae, some of which live in the digestive tracts of animals, providing them with the vitamin B₁₂ which we in turn consume in their flesh, milk, and eggs. Although B₁₂ can also be manufactured by microorganisms in the human intestine, nutritionists have generally believed that any B₁₂ manufactured in this way is either insignificant in amount or not bioavailable. In particular, most nutritionists have believed for some time that although B₁₂ is absorbed in the human ileum (the last segment of the small intestine), it is only manufactured in significant amounts in the colon (the large intestine, lower in the digestive tract). Given these beliefs about B₁₂ metabolism, it is reasonable to expect that a vegan diet, excluding all animal products, would be deficient in vitamin B₁₂.

However, from the first scientific studies of vegan nutrition until the present, nutritionists have been puzzled by the fact that so few vegans actually develop B₁₂ deficiencies. As one early researcher put it: "The question seems not to be why do some people on this form of diet develop vitamin B₁₂ deficiency, but why many subjects do not."⁴ Researchers have found that deficiencies are only likely to develop when accompanied by absorption problems which are unrelated to the diet itself.⁵ It therefore seems likely that most vegans get enough B₁₂ without supplementation. Possible sources are contamination of root crops by B₁₂-producing microorganisms in the soil and production of significant amounts of B₁₂ in the ileum, where the vitamin is bioavailable.⁶

In any event, the scientific research hardly shows that vegans, whether male or female, face significantly higher risk of developing B₁₂ deficiency, because no reason has been given to believe that they are any more likely than omnivores to develop the sort of absorption problems which trigger deficiency.

Vitamin D

A similar picture emerges with respect to vitamin D. It is not clear why anyone would expect vegans, male or female, to be particularly at risk for developing vitamin D deficiency (rickets in children, osteomalacia in adults). This is because, with the exceptions of eggs, fish, and liver, animal products are poor in vitamin D (commercial milk is a good source only because it has been "fortified" with a vitamin D supplement), and because the body synthesizes sufficient vitamin D as

long as one is exposed regularly to sunlight. If you get enough sun, you don't need to consume *any* vitamin D in your food.

Nevertheless, in her recent summary of "Nutritional Consequences of Vegetarianism," Johanna Dwyer includes vitamin D deficiency on her list of "Dietary Inadequacies that May Arise on Vegetarian Diets,"⁷ and the American Dietetic Association's 1987 guidelines for vegans include the recommendation that individuals with limited exposure to sunlight supplement their diets with vitamin D.⁸ Below, I discuss Dwyer's review in general and her discussion of vitamin D in particular. What is crucial for present purposes is to note (as Dwyer implicitly admits)⁹ that the ADA's recommendation does not reflect any additional risk which vegans (or female vegans) run *vis-à-vis* omnivores. *Anyone* who spends the winter in a very cold climate or who for other reasons gets very little sun, is at increased risk for vitamin D deficiency and vegans are advised to take a vitamin D supplement only if their exposure to sunlight is limited.

Calcium

It was only with the recent domestication of livestock that humans became the first mammals to consume milk routinely beyond infancy. Nevertheless, in "Calcium in Evolutionary Perspective," S. Boyd Eaton and Dorothy A. Nelson argue that the late paleolithic hunter-gatherers from whom modern humans evolved "existed in a high-calcium environment" and led more strenuous lives than do contemporary humans (weight bearing exercise decreases bone loss), so that our species has evolved a need for calcium which cannot easily be met today without consuming dairy products.¹⁰ Based on studies of hunter-gatherer cultures in this century, pre-agricultural humans are assumed to have obtained about 33% of their daily energy intake from meat. On this basis, Eaton and Nelson estimate that paleolithic hunter-gatherers obtained about 95% of their calcium from plant sources, and yet consumed about 1800 mg Ca/day, nearly twice the current U.S. RDA and about three times the estimated daily average intake in the U.S. today.¹¹ Since pre-agricultural humans did not consume dairy products and meat is a poor source of calcium, it is not obvious why vegans should be at increased risk given that many plants are rich in calcium. Eaton and Nelson point out, however, that modern agricultural societies rely heavily on cereal grains, which are a very poor source of calcium *vis-à-vis* green leafy vegetables and the various uncultivated plants on which early hunter-gatherers relied.¹²

Growing concern over high rates of osteoporosis among the elderly, and especially among postmenopausal women (who lose bone mass more quickly) has led some nutritionists to recommend very high calcium intakes, some of them comparable to the intakes Eaton and Nelson postulate for paleolithic hunter-gatherers. In 1984, a Consensus Development Conference on Osteoporosis convened by the National Institutes of Health recommended an intake of 1000 to 1500 mg/day,¹³ although the U.S. Government's Committee on Dietary Allowances recommends only 800 mg/day and the U.S. RDA is 1000 mg/day.¹⁴

However, as D.M. Hegsted noted in a 1986 article, calcium consumption is positively correlated with osteoporosis, at least as measured in terms of hip fractures

per 100,000 women. Countries with higher per capita calcium consumption also have a higher incidence of hip fractures, presumably reflecting higher rates of osteoporosis. Although Hegsted's observation proves no specific etiology, he mentions two possible explanations. The first is an explanation which had already gained some currency in the nutrition literature by the time Hegsted wrote. Because the modern diets which are high in calcium also tend to be high in protein, and because high protein intake increases the osmotic load on the kidney, high protein diets could adversely affect the kidney's ability to regulate formation of calcitriol, an intrinsic factor which improves the efficiency of calcium utilization.

But in addition to this popular explanation of the positive correlation between calcium intake and osteoporosis, Hegsted offers a second possible explanation. He notes that low calcium intakes are known to raise circulating levels of calcitriol, whereas high calcium intakes decrease circulating levels of calcitriol. He then argues that life-long high calcium intake could actually predispose individuals to osteoporosis:

This [increased calcitriol formation in response to low dietary calcium] almost certainly explains why calcium deficiency is so rare throughout the world wherever calcium intakes are low by American standards. The available evidence is consistent with what must be true—that increased calcium needs associated with growth, pregnancy and lactation are met under most conditions by increased levels of calcitriol and, thus, more efficient utilization of dietary calcium. People who are adapted to high calcium diets are, inevitably, rather inefficient utilizers of dietary calcium. Otherwise, such populations would have excessively large skeletons or suffer from calcium intoxication, and populations with relatively low intakes would be unable to form normal skeletons. If women in general required 800 mg calcium/day or more, calcium deficiency and osteoporosis would be rampant throughout the world.

Until contrary evidence is available, the possibility must be considered that a life-long adaptation to a high calcium diet with a continual suppression of calcitriol formation and inefficient utilization of dietary calcium may eventually impair the ability of the body to utilize dietary calcium and to conserve body calcium.¹⁵

I have quoted Hegsted's argument at length because, although it has a plausible basis in nutritionists' current understanding of calcium metabolism, Hegsted's alternative explanation of the relationship between dietary calcium and osteoporosis has been largely ignored by nutritionists writing on the subject.

Of course it is not my purpose to settle the controversy over why dietary calcium intake is positively correlated with osteoporosis. My point is only that the research to date does not unambiguously indicate that vegans, even vegan women, face significantly higher risks of deficiency than do omnivores. Eaton and Nelson's estimates notwithstanding, there are reasons to believe vegan women face no greater risks at all: huge calcium intakes of the kind recommended by some nutritionists to stave off osteoporosis may either be counterproductive (if Hegsted's

speculation is true) or only necessary on diets high in protein due to reliance on meat and dairy products (as suggested by the more popular causal hypothesis).

Iron

Many plant foods are high in iron, especially as measured in terms of the ratio of iron to calories in a typical serving. Calorie for calorie, spinach, lettuce, green beans, tofu, and blackeyed peas all contain more iron than even the leanest cuts of sirloin steak.¹⁷ However, the kind of iron found in plants—non-heme iron, that is, iron not associated with hemoglobin—is generally less bioavailable than heme iron, which is found only in meats.

Still, it is not clear that this puts vegans at significantly higher risk of anemia than omnivores. For one thing, absorption of non-heme iron can be increased two- to fourfold by simultaneous consumption of vitamin C.¹⁸ But more importantly, even omnivorous women commonly are urged to take iron supplements, because 80% of the body's iron is contained in hemoglobin, large quantities of which are lost through menstruation. This means that the importance and the efficacy of iron supplements are both widely recognized. It is therefore unclear why a vegan diet should be especially risky, even for women. Even if they are urged to take an iron supplement, they are simply being urged to do something that omnivorous women commonly are urged to do.

III. Children on Vegan Diets

Like pregnant and lactating women, the metabolic and nutritional needs of growing children differ from those of adult males, and it is now well-confirmed that the growth of vegan children lags behind that of omnivorous cohorts after weaning.¹⁹ For instance, one study found that between 37 and 52% of weaned vegan children fall below the 25th percentile in weight and length for their age.²⁰ However, this line of research does not clearly show that children are at greater risk for health problems on vegan diets, for two reasons.

First, the subjects of these studies have been mostly members of religious sects with especially restrictive diets and a tendency to eschew nutritional supplements and professional medical supervision and care. In the study mentioned above, for instance, 49% of the children were macrobiotics and another 24% were "members of yogic groups."²¹

Second, and more fundamentally, the variations in length and weight observed in such studies still fall "within normal limits."²² Vegans do not regularly produce dwarves. The fact that vegan children are significantly shorter and lighter than average hardly suffices to show that they are at significantly greater risk for health problems. Dramatic discrepancies between the growth velocities of malnourished children in the third world and average American children *are* strongly correlated with increased morbidity and mortality, but the discrepancy between weaned vegan children and their omnivorous cohorts is *not* of this dramatic magnitude.

What we need to know is how vegan and omnivorous children compare on such measures as IQ tests, athletic performance (except, perhaps, basketball!), longevity,

and overall frequency of disease. One comparison of intelligence exists, and the vegan children in it were significantly more intelligent than average (as measured by standard mental age and I.Q. tests), although the researchers speculated that the difference was attributable to parental education rather than to diet.²³ So no adequate study has yet been made comparing the general health of omnivorous children with that of vegan children on nutritionally enlightened diets. Certainly this lack of relevant data does not prove that vegan diets are safe for children. But just as certainly, the available research does not show that vegan children on nutritionally enlightened diets are significantly more likely to be unhealthy (on any reasonable conception of “unhealthy”) than omnivorous children.

IV. The Poor and “Undereducated” on Vegan Diets

Whether a vegan diet will be significantly more expensive or difficult to achieve depends on what the nutritional guidelines turn out to be. But as the discussion so far has suggested, for each of the specific nutrients vegans commonly are cautioned to be cognizant of (calcium, folic acid, iron, zinc, and vitamins B₆, B₁₂, and D) there is reason to believe that vegans are *not* at significantly higher risk of developing deficiencies than are omnivores, at least if they eat a highly varied diet.

The American Dietetic Association’s (ADA’s) 1988 guidelines for vegans reflect a similar view of vegan nutrition. They come to this: eat (1) a variety of vegetables and fruits each day, including (2) a large helping of legumes and a large helping of grains, (3) take a vitamin B₁₂ supplement, and (4) if your exposure to sunlight is limited, take a vitamin D supplement.²⁴ Anyone who can learn the meaning of “legume” and find the vitamin section in the supermarket can understand how to follow these guidelines, and, if the added cost of supplements is equal to or less than the money saved by not buying meat and dairy products, then the poor might be able to eat more cheaply by following these guidelines.

V. Methodological and Rhetorical Biases

The foregoing considerations show that, given a critical reading, the available nutrition research does not unambiguously demonstrate that vegetarian, even vegan diets are significantly more risky than omnivorous ones, or that they are significantly more risky for women than for men. Still, much of the scientific literature on vegetarian nutrition leaves one with the impression that vegan diets are significantly more risky. Part of the reason is that this literature is subtly biased against vegan diets.

First, researchers tend to identify vegans with “new vegetarians,” or design their research around “new vegetarians.” “New vegetarian” is the nutrition researchers’ term for members of religious sects with especially restrictive diets and a tendency to eschew nutritional supplements and professional medical supervision and care.²⁵ Examples of “new vegetarians” are macrobiotics, Black Hebrews, Yogics, Hare Krishnas, and Rastafarians.

The studies of growth velocities in vegan children discussed earlier are an example of the tendency to base studies of veganism on “new vegetarians.” While

these studies did not *equate* vegans with “new vegetarians,” their study populations were strongly skewed towards “new vegetarians.” Almost 75% of the children in the study were members of “new vegetarian” groups.²⁶ But these are, arguably, the *last* groups we would expect to live healthy lives as vegans. A macrobiotic, for instance, is an adherent of a loosely organized religious sect popularized in the middle of this century by George Ohsawa, who advocated ultimately eating only a highly simplified diet composed largely of brown rice. Identifying vegans with macrobiotics is like identifying singing with Gregorian chant. The monastic male “exist[ing] on a limited diet of bread and water” may be, as Kathryn Paxton George puts it in “Discrimination and Bias in the Vegal Ideal” (in this volume) “a vegan ideal,” but it is certainly not *the* vegan ideal.

A recent study of vitamin B₁₂ metabolism evinces researchers’ tendency to identify vegans with “new vegetarians”²⁷ in their own thinking. All of the children in this study were macrobiotics, but given that the study was focussed specifically on the relative effectiveness of algae (nori) in alleviating vitamin B₁₂ deficiency, this was not a problem. The study was not aimed at establishing *how* the children had become deficient, but rather at comparing the efficacy of various supplements in treating existing deficiency. After finding that while B₁₂ from the algae was absorbed into the children’s bloodstreams, it did not eliminate the clinical signs of B₁₂ deficiency (which usually respond very quickly to treatment), the researchers concluded (correctly) that “its bioavailability is questionable.” However, they at one point refer to “the *vegetarian* (i.e., *macrobiotic*) philosophy.”²⁸ This is an isolated and off-hand remark, but the tendency evinced in the italicised phrase, to identify vegetarians (especially vegans) with “new vegetarians,” is widespread in the nutrition literature.

A particularly interesting example of this tendency is the work of Johanna Dwyer. Although a number of her publications could be discussed in a similar vein,²⁹ here I will discuss only her recent overview of “Nutritional Consequences of Vegetarianism.” As noted earlier, Dwyer includes vitamin D deficiency on her list of “Dietary Inadequacies that May Arise on Vegetarian Diets,” despite the fact that what creates the risk of vitamin D deficiency is inadequate exposure to sunlight, something that vegans are no more (nor less) susceptible to than omnivores. The reason appears to be that even a nutritionist of Dwyer’s stature tends to confuse “vegan” and “new vegetarian.” For, having noted that vitamin D supplementation is only necessary if one’s exposure to sunlight is inadequate, she writes: “In the United States, milk and certain other foods are fortified with vitamin D, but vegans, who avoid all animal foods *and often reject fortified foods and vitamin supplements*, do not obtain vitamin D from these foods.” And on the same page, near the end of her discussion of calcium deficiencies, Dwyer states flatly: “*Vegans avoid prescribed medications that waste calcium, rarely use large amounts of caffeine, [and] do not smoke.*”³⁰ While it *may* be true that vegans “often” also avoid fortified foods (but I doubt it—I predict that “sometimes” would be more accurate),³¹ it is simply false that “Vegans [by definition] avoid prescribed medications . . . rarely use large amounts of caffeine, [and] do not smoke.”

“Vegan” refers to a nutritional category rather than to persons’ religious or other beliefs. By designing research on veganism around “new vegetarians” and sometimes even equating the two, nutrition researchers are in a subtle way biasing both the data and their readers’ attitudes towards veganism. This may not be their intention, but it certainly presents the student of nutrition with a skewed impression of veganism and could lead to an inaccurate characterization of the risks involved.

The second general way in which the nutrition literature is biased against veganism is that overviews of research on vegetarianism tend to spend more time on risks than on benefits, and--more significantly--the reviewers’ rhetoric is sometimes subtly different when risks are being discussed rather than benefits.

Again, Dwyer’s review of the “Nutritional Consequences of Vegetarianism” evinces both tendencies. In terms of space, seven pages are devoted to “Dietary inadequacies that may arise on vegetarian diets,” plus five and one half pages to “Vegetarian diets and the life cycle,” a catalogue of risks keyed to age. However, only two pages are devoted to “Decreased risks of chronic degenerative diseases on vegetarian diets,” and in this section of her review, Dwyer entirely ignores work by T. Colin Campbell, one of the principal investigators on a major study of diet and nutrition in China, the results of which he has used to advocate veganism. Campbell has become a controversial figure, with some researchers dismissing him because of supposed affinities with the animal rights movement and others dismissing him because of the tenor of his presentations at meetings. But neither reason is sufficient for ignoring his relevant peer-reviewed scientific publications, which are legion.

Dwyer’s way of describing experimental results is also subtly biased against vegetarian diets. When she discusses a weakly established correlation between a vegetarian diet and a health *benefit*, her rhetoric varies subtly from when she discusses a weakly established correlation between a vegetarian diet and a health *risk*. When one or a few studies find a correlation between vegetarianism and a health risk, these studies are described as “suggesting” that the risk exists, whereas when one or a few studies find a correlation between vegetarianism and a health benefit, the claimed benefit is described as “not well supported.” For instance, during a discussion of reproductive and menstrual status, Dwyer cites “several reports in the literature” and says that these “suggest” that vegetarian women face an increased risk of decreased estrogen bioavailability.³² But earlier, when discussing the few studies finding positive benefits concerning colon cancer and osteoporosis, she says that whether these health benefits exist “remains a topic of active debate,” and notes that “these claims are not as well supported by experiment or observational studies as are the [positive] effects [on blood pressure, hypertension, etc.] already discussed.”³³ Why emphasize this in the case of weakly confirmed health benefits but not in the case of weakly confirmed health risks? In each case there are more and less well confirmed findings. Describing weakly confirmed health benefits in a different way than she describes weakly confirmed health risks subtly prejudices her readers.

VI. Conclusion

Women and children undoubtedly have different nutritional needs than men, but the available nutrition literature does not decisively establish that vegan diets are significantly less likely than omnivorous diets to meet their needs. "Vegan" refers to a dietary category which is separable in practice from beliefs about the use of food supplements and additives, and the provision of professional medical care. Nutritionists advising consumers on the risks and benefits of vegan diets should not assume that those adopting a vegan diet will eat especially simplified diets and eschew medical supervision and fortified foods. Unfortunately, study populations of vegans have been heavily weighted towards individuals who do just that, and it takes a fairly critical and close reading of the literature to discover this. Nevertheless, a critical reading also reveals that, for every specific nutrient vegans commonly are cautioned to be cognizant of, there is reason to think that vegans are *not* at significantly higher risk of deficiency than are omnivores.

The fundamental worry underlying Kathryn Paxton George's recent writings on vegetarianism is: *From whose perspective* are we to decide what we should eat? In this paper I have addressed her concern that holding out vegetarianism as a moral ideal discriminates against women because it can only be done from a male perspective. I have argued, in effect, that while males' and females' nutritional needs are indeed different, we do not have reason to believe they are so different that a vegetarian (even vegan) ideal cannot also be endorsed from the perspective of females, at least where, as in the contemporary United States, people have access to a wide variety of inexpensive foods. Nothing I have said in this paper implies that persons in developing countries could easily lead healthy lives as vegetarians or vegans. Where (as in Mali, for instance) people do not have access to a variety of non-animal foods, eschewing meat all but insures malnutrition. For a brief response to George's related worry that therefore my argument relegates the third world (and therefore the majority of the world's people) to a moral underclass, see the end of my "What's Wrong with Animal *By-products*?" (this issue).³⁴

Notes

1. Kathryn Paxton George, "So Animal a Human . . . , or the Moral Relevance of Being an Omnivore," *Journal of Agricultural Ethics* 3 (1990), pp. 172-186; "Should Feminists be Vegetarians?" forthcoming in *Signs: Journal of Women in Culture and Society*; and "Discrimination and Bias in the Vegan Ideal" (this issue).
2. For a comparison of this conception of risk, which is the risk analyst's conception, to a common sense conception of risky behavior as whatever departs from traditional precedents, see Paul B. Thompson, "Agricultural Biotechnology and the Rhetoric of Risk: Some Conceptual Issues," *The Environmental Professional* 9 (1987), pp. 316-326. On the latter conception, whether or not vegetarian diets are risky would depend on what culture one lives in.
3. Johanna T. Dwyer, "Nutritional Consequences of Vegetarianism," *Annual Review of Nutrition* 11 (1991), pp. 61-91, at pp. 67 and 69.
4. Cited in Alan Immerman, "Vitamin B12 Status on a Vegetarian Diet," *World Review of Nutrition and Dietetics* 37 (1981), pp. 38-54, at p. 40.
5. Anonymous, "Vegetarian Diet and Vitamin B₁₂ Deficiency," *Nutrition Reviews* 36 (1978), pp. 243-244.

6. See the comprehensive review of available literature by Alan Immerman, "Vitamin B₁₂ Status on a Vegetarian Diet," *World Review of Nutrition and Dietetics* 37 (1981), pp. 38-54, at pp. 45-47.
7. "Nutritional Consequences of Vegetarianism," p. 61 (table of contents).
8. "Position of the American Dietetic Association: Vegetarian Diets—Technical Support Paper," *Journal of the American Dietetic Association* 88 (1988), pp. 352-355.
9. "Nutritional Consequences of Vegetarianism," p. 68.
10. S. Boyd Eaton and Dorothy A. Nelson, "Calcium in Evolutionary Perspective," *American Journal of Clinical Nutrition* 54 (1991), supplement, pp. 281S-287S.
11. Eaton and Nelson, "Calcium in Evolutionary Perspective," p. 282S. Eaton and Nelson assume a daily intake of 689 g meat and 1279 g plant foods, with a calcium content of 14.2 and 133 mg Ca/100 g portion, respectively (p. 282S). That translates into 97.84 mg Ca/day from meat and 1701.07 mg Ca/day from plant foods, meaning that only 5.44% of the daily calcium intake was from meat sources.
12. *Ibid.*, p. 285S, table 7.
13. U.S. Government, "Osteoporosis," National Institutes of Health Consensus Development Conference Statement, vol. 5, no. 3.
14. U.S. RDAs are used for food labeling purposes. The Committee on Dietary Allowances makes recommendations for changes in U.S. RDAs every five years. The disparity is a safety margin.
15. D.M. Hegsted, "Calcium and Osteoporosis," *Journal of Nutrition* 116 (1986), pp. 2316-2319, at pp. 2316-2317.
16. Regarding Eaton's and Nelson's estimate of paleolithic calcium consumption, it is important to remember that few of these early humans lived to an age at which bone loss typically becomes a problem.
17. Whitney, *Understanding Nutrition*, chart p. 415.
18. Dwyer, "Nutritional Consequences of Vegetarianism," p. 64.
19. C. Jacobs and J.T. Dwyer, "Vegetarian Children: Appropriate and Inappropriate Diets," *American Journal of Clinical Nutrition* 48 (1988), pp. 811-818, at 813.
20. J.T. Dwyer, et al., "Preschoolers on Alternate Life-Style Diets," *Journal of the American Dietetic Association* 72 (1978), pp. 264-270, at p. 267. See also M.W. Shull, J.T. Dwyer, et al., "Velocities of Growth in Vegetarian Preschool Children," *Pediatrics* 60 (1977), pp. 410-417, using the same study population.
21. Dwyer, et al., "Preschoolers on Alternate Life-Style Diets," p. 265; Shull, Dwyer, et al., "Velocities of Growth in Vegetarian Preschool Children," p. 411 (both studies used the same children).
22. Beverly M. Calkins, "Executive Summary of the Congress" (First International Congress on Vegetarian Nutrition), *American Journal of Clinical Nutrition* 48 (1988), pp. 709-711, at p. 710.
23. Dwyer, et al., "Mental Age and I.Q. of Predominantly Vegetarian Children," *Journal of the American Dietetic Association* 76 (1980) pp. 142-147, at 145.
24. "Position of the American Dietetic Association: Vegetarian Diets—Technical Support Paper," *Journal of the American Dietetic Association* 88 (1988), pp. 352-355.
25. The American Dietetic Association's 1980 "Position Paper on the Vegetarian Approach to Eating" offers the following definitions, which are now standard in the literature.

New vegetarians are "persons who have recently adopted vegetarian dietary patterns after an omnivorous childhood and who either belong to one of the philosophical, quasi-religious, or religious groups heavily influenced by Eastern thought which have arisen since 1960 in this country, or who have adopted alternate life style diets of an individualistic nature. Emphasis and diet vary greatly among these groups, but in addition to some degree of animal food avoidance, proscriptions on other foods are usually involved, such as avoidance of foods not considered to be 'organic', 'natural', unprocessed, or unrefined. Special 'health' foods may also be used."

Traditional vegetarians are “persons who adhere to vegetarian patterns which have been extant for many generations. This term also applies to persons raised within cultural or religious groups with long-standing customs of vegetarianism in other countries, who now reside in the United States. Emphasis among these groups is primarily on some degree of animal food avoidance and to a lesser extent on the use of unrefined or naturally occurring food sources.”

Individualistic vegetarians are “persons who eat various types of vegetarian and other alternate life style diets but who do not adhere to the philosophy of a particular dietary group, adopting their own pattern of eating.”

Journal of the American Dietetic Association, 77 (1980), pp. 61-69, at p. 61.

26. Dwyer, et al., “Preschoolers on Alternate Life-Style Diets,” p. 265; Shull, Dwyer, et al., “Velocities of Growth in Vegetarian Preschool Children,” p. 411 (both studies used the same children).

27. I continue to use quotation marks around “new vegetarians” to emphasize how misleading the label is. “Religious fanatics and cult members” would be more accurate.

28. Pieter-C. Dagnelie, Wija A van Saveren, and Henk van den Berg, “Vitamin B¹² from Algae Appears not to be Bioavailable,” *American Journal of Clinical Nutrition* 53 (1991), pp. 696-697, at p. 697, emphasis added.

29. See, for instance, Dwyer, et al., “Growth in ‘new’ Vegetarian Preschool Children using the Jenss-Bayley Curve Fitting Technique,” *American Journal of Clinical Nutrition* 37 (1983), pp. 815-827, at 816; Johanna Dwyer, et al., “Mental Age and I.Q. of Predominantly Vegetarian Children,” *Journal of the American Dietetic Association* 76 (1980), pp. 142-147, at p. 142; and Johanna Dwyer, “Nutrition Status and Alternative Lifestyle Diets with special reference to Vegetarianism in the USA,” in M. Reichaig, ed., *CRC Handbook of Nutritional Supplements*, vol. 1, *Human Use* (Boca Raton, Florida: CRC Press, 1983), pp. 343-410, at p. 343.

30. “Nutritional Consequences of Vegetarianism,” p. 68, emphasis added.

31. I have known a number of vegans and near vegans, and to my knowledge, none of them avoided fortified foods. It may well have been true in the past that almost all vegans were also members of curious cults with superstitious restrictions on medication and additives, but increasingly, the people who become vegans do so for moral reasons having nothing to do with food additives. Or so I predict that surveys would reveal.

32. Dwyer, “Consequences of Vegetarianism,” p. 75.

33. *Ibid.*, p. 73.

34. Robert Hagevoort and Jon Moritz, two graduate students in human nutrition at Texas A&M, provided me with valuable bibliographic guidance during preparation of this paper, but they disagreed with many of the conclusions I drew and any lacunas in my research are my responsibility.