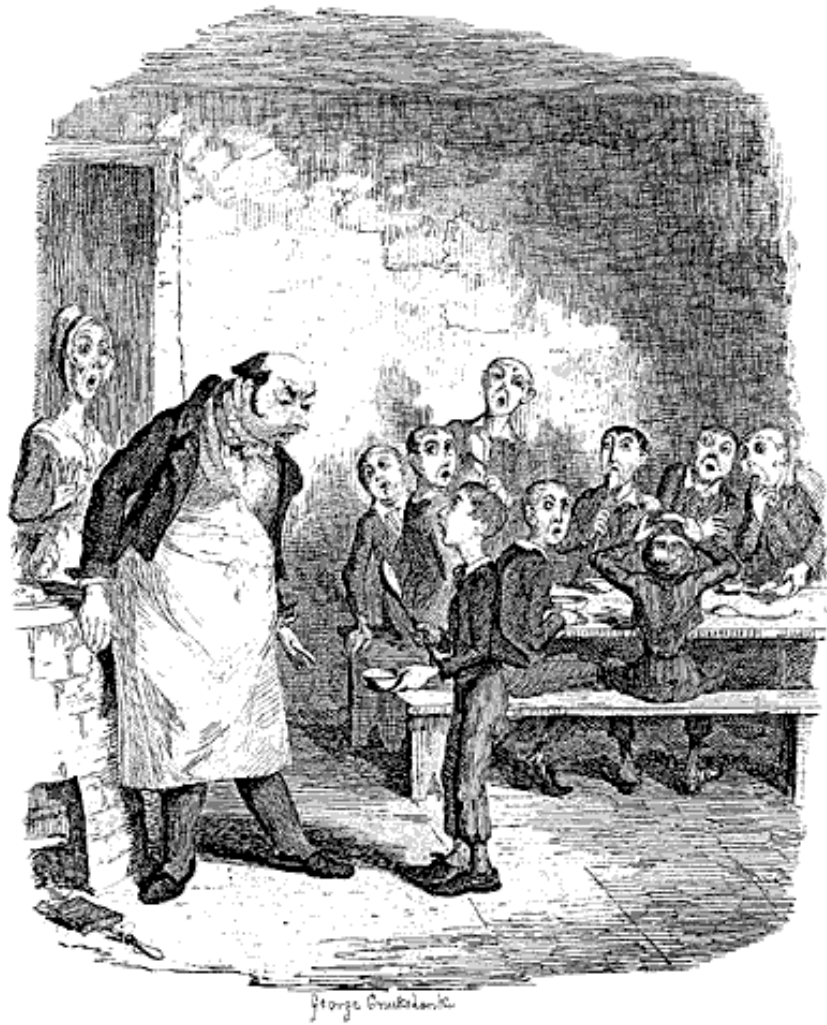


Is Vegetarianism a Form of Child Abuse?

John Mayer



George Cruikshank

Is Vegetarianism a Form of Child Abuse?

John Mayer

Knowledge of nutritional principles enable the nurse to provide important educational advice to patients as they prepare to leave the hospital or in a clinical setting. Some dietary principles are well-known and as incontrovertible as any scientific statements can be. However, nutrition is still a relatively young science and there are many areas in which reasonable people may disagree, sometimes passionately. When a nurse's patient has dietary practices that are outside the mainstream it is important to be adequately informed when we venture to make recommendations supporting their choices or urging them to seek information more solidly grounded in science.

Vegetarianism is a feature of many religions, including Hinduism and some forms of Buddhism, and is becoming more popular in western countries. People who have not been raised in a vegetarian culture adopt vegetarian diets for a variety of reasons, ethical, environmental or health-oriented. But is a vegetarian diet really healthy? More urgently, is it acceptable for a family to eliminate meat or, in the case of veganism, all animal products from their diet and to place these same restrictions upon their children?

Some scientists say no, some even going so far as to equate vegetarianism with child abuse. For example, in a paper in *The Journal of the Royal Society of Medicine* entitled "Malnutrition in infants receiving cult diets: a form of child abuse." By I. F. Roberts, R. J. West, D. Ogilvie, and M. J. Dillon, the authors say, "interest is growing in cult diets that are largely or wholly vegetarian. The children of adherents to such diets may be at risk of nutritional disorders. ... Children reared in this way have depressed growth rates up to the age of two years, suggesting suboptimal nutrition." They specifically warn of the dangers of veganism, and go so far as to suggest that authorities should intervene: "When children are found to be suffering from undernutrition due to parental food faddism a court order will normally be a necessary step in providing adequate treatment and supervision."³⁵ Obviously, vegetarian parents will bristle at the thought of emergency meat intervention for their children.

In a talk at the annual meeting of the American Association for the Advancement of Science Lindsay Allen, of the US Agricultural Research Service, attacked parents who fed their children a vegan diet as "unethical." She described an experiment she had carried out among undernourished African school children which Allen said demonstrated the need for meat in children's diets. The results, she said, are highly relevant to children in developed nations. "Deficiencies of micronutrients such as vitamin A, B-12, iron, zinc, calcium and riboflavin in developing nations are mainly due to the fact that there is not enough meat, dairy products, eggs or fish in the diets," she said in a statement before the American Association for the Advancement of Science symposium.

The study was partially funded by the National Cattleman's Beef Association.³⁶

Dr Alastair Sutcliffe, senior pediatrics lecturer at University College London, was quoted at the same presentation as saying human ancestry shows a natural diet includes meat and is likely to produce a taller, stronger child.

More commonly, vegetarian and vegan diets are damned with faint praise. *Contemporary Maternal-Newborn Nursing Care* by Ladewig, London and Davidson says, "If the [pregnant] woman follows a vegan diet, careful planning is necessary to obtain complete proteins and sufficient calories."²⁷ It warns she may need calcium and vitamin D supplements and adds that the "best" sources of iron and zinc are animal products. Best in what way is not specified. The *Textbook of Medical-Surgical* warns of the dangers of fad diets and strict vegetarianism in the same sentence.³⁸

Of course, scientists are not free from their own prejudices and suppositions. If Dr. Sutcliffe assumes *a priori* that our "ancestry" proves meat is natural to the human diet, then that assumption must be integrated into all conclusions deriving from that point of origin, and all diets that deviate from the "natural" must be regarded with suspicion. One might argue that "natural" doesn't always imply maximum benefit as, for example, vaccinations with killed viruses are not natural. But the fact is that Dr. Sutcliffe's assumption is not based on science but, more likely, dietary inclinations of his own which he has never questioned. The question of a "natural" human diet will be touched upon later in this paper.

If scientists themselves are subject to their own dietary prejudices, we should not be surprised to observe that the general public is as well. As such statements are made public, with little attendant rebuttal, the great majority of our culture is more than happy to be reassured that not only are they not required to make any changes in their own or their children's menu, but also that, by simple virtue of doing nothing, they are ethically superior to those "faddists" who deny their children the pleasures and benefits of animal-derived foods.

In fact, discussions of the merits of vegetarianism and veganism are often more heated than political arguments, often moving into extremes of invective usually reserved for those who attack our religion. After all, it is not only our own habits that are in question but also, it seems, the judgment and decency of our mother and grandmother and all their forebears who handed down the fondly remembered family recipes. One site devoted to attacking vegetarian practices is titled simple "Vegetarians Are Evil."⁸ It lists Cain as the first vegetarian, among other great vegetarian villains.

In the face of so much official skepticism, it is also not surprising that the public has begun to equate vegetarian parenting as something akin to not bothering with infant car seats, or worse. An episode of the medical show *House* on the Fox network portrayed a couple in danger of losing their child due to dietary neglect. The resourceful Dr. House was able to prove that the infant suffered from some rare disorder and that the parents were not guilty of child abuse, just of being "idiots."

Possibly the House episode was inspired by an incident in Florida the year before it aired. A headline regarding the death of an infant in Florida whose parents also practiced an exceptionally strict raw foods diet, much more limited than the standard vegan diet, read simply, “Vegan Parents on Trial for Baby’s Death.” The diet of the Black Hebrew Israelite couple was not one most vegans would endorse; the mother even denied the baby breast milk after three months. Still, the defense presented nutritionists and pathologists who testified that the child had not died from malnutrition at all, but from DiGeorge syndrome, a thymus gland defect which limits the body’s ability to fight off infections. The jury, apparently convinced, found the parents not guilty of killing their daughter with veganism, but convicted them of neglecting their other children all the same since the parents had fed them the same “vegan” diet. Testimony indicated the other four children were well below the average weight for their age group, though, prior to the baby’s death, agents of the Florida Department of Children & Families had pronounced all the couple’s children well-nourished and in good health.²¹

A couple in Queens, New York also denied their child breast milk and fed her a deficient diet, though they did feed her cod liver oil, obviously a food of animal origin. Nonetheless, the parents were described in headlines as “vegan:” the banner in the *New York Post* read, “Vegan Couple Starved Toddler, Cops Say.”²⁰ Not mentioned is the fact that the infant had been born at home three months premature, had had scant medical care, and had gone into respiratory arrest while undergoing a routine, mandated exam in the hospital and after having been given a second dose of sedative shortly after a first appeared to have been ineffective.

After a couple in the East Valley section of Phoenix Arizona was arrested for depriving their children of adequate food it was revealed a four-year old daughter had died earlier of meningitis; the parents had resisted medical treatment, opting instead for naturopathic “remedies.” The headlines that followed that discovery made no mention of the part the parents’ rejection of modern medicine had played in their daughter’s death, however. One headline in the *East Valley Tribune* read “Accused E.V. vegan couple’s child died earlier.”¹⁹ Another, in the *Arizona Republic*, read, “Vegan found guilty of child abuse.”²⁶ The heading on the Tucson Fox affiliate KTVK-TV webpage claims, “Couple says Vegan lifestyle is responsible for children's condition.”¹⁴

On the other hand, Vanessa Jackson, indicted earlier with her husband who has since died, was convicted early last year of starving four of their seven adopted children while she, herself, appears to have missed very few meals. Newspaper accounts of this and other recent cases of the starving of children by their supposed caregivers have made no mention of the parents’ omnivorous lifestyle.^{7, 16}

Not surprisingly, letter columns and online blogs are filled with outraged citizens who have no patience with such foolish faddism, especially when it puts helpless children at risk. Drowning out the scattered protests from vegans are comments that “man is an omnivore, not an herbivore” and “it’s common knowledge that some amino acids can only be found in meat” and “if we weren’t meant to eat meat we wouldn’t have canine teeth.” The lack of scientific sophistication in such forums is scarcely surprising, but

these assumptions are mirrored in the attitudes of professionals as well. Recently, I asked the dietitian in the birthing unit at the University of Tennessee for recommendations for researching vegan diets in early childhood. A cloud passed over her face. “Well, it can be done, but it’s very difficult. Very careful planning is required.”

Such widespread skepticism about the folly of veganism, especially where children are concerned, raises troubling questions about whether a vegan parent who comes under scrutiny could hope for a fair hearing from reporters, judges, juries, nutritionists and physicians, most of whom, like the majority of Americans, are meat-eaters and more likely to challenge unfamiliar diets than the one they themselves are comfortable with. Anyone who has spent any time in a neonatal ward quickly becomes conscious of how delicate a child can be, and how many problems can present themselves in birthing and early childhood. Would a congenital problem that might arouse sympathy for parents who eat a mainstream diet arouse suspicions of neglect in vegan parents? Would a mother who had been reckless about prenatal care, even to the point of using alcohol or drugs, be condemned less than a mother who stubbornly refuses to eat the same diet the staff eats? Would child protective services be inclined to remove children from homes where the parents are actually more attentive to their baby’s nutritional needs than the average? Would vegetarianism be a factor in custody decisions?

Perhaps even more importantly, if it happened to be that veganism is actually, contrary to popular belief, actually healthier for children as well as adults, if it were, in fact, the natural diet of human beings, if a conversion of a large part of the nation’s population to a vegan diet could actually make a substantial improvement to the health of our citizenry and to the health of our environment, then allowing erroneous assumptions about diet to go unchallenged in professional journals and popular media would be a tragic failure. Confronting the facts of the dangers or merits of giving up animal-based foods is of major importance to the welfare of the American public in general and to that of our children in particular. It is important for both sides of the issue to consider the facts with open minds.

Most of the strongest criticism is directed toward the “strict” vegetarian diet, that is, veganism. Since the animal products eggs and milk that are part of an ovo-lacto-vegetarian diet contain all the nutrients to be found in meat (milk contains no iron, but eggs do), the primary focus here will be veganism. One of the most basic issues to consider in such a discussion is whether a vegan diet is or is not an “unnatural” diet for man.

Even if man evolved as an omnivore that does not necessarily mean that veganism is *ipso facto* unhealthy. Cats and dogs now thrive on special vegan diets and meat meal is mixed into cattle feed. It is not hard to imagine, in fact, that a scientifically planned and carefully processed diet could be developed that could be even healthier and less expensive to produce than the diet evolution adapted us to .

But the facts do not demonstrate a carnivorous or omnivorous ancestry; quite the contrary. It is beyond the scope of this paper to demonstrate the genetic foundation of the human diet and how our ancestors might have diverged from it, but I provide some discussion of that topic in Appendix A, an informal paper I wrote a few years ago for a

local newsletter. In 2005 Robert W. Sussman, Ph.D., professor of anthropology in Arts & Sciences at Washington University in St. Louis, with anthropologist Dr. Donna Hart, published *Man the Hunted* which presents the case that our ancestors were not meat-eating predators but prey.⁴⁰ But the matter that concerns us here is not the diet that is most natural for us, but the diet that will best sustain our young and us. After all, according to Sussman and Hart, nature had decreed that six to ten percent of us serve as food for predators. We have long since ceased to obligingly accept the dictates of nature. We are no longer denizens of the jungle. Might it be that plant foods now available to us are deficient in important nutrients?

In one case that is certainly true: the vegetables in the produce aisles and frozen food sections of modern American supermarkets are very much lacking in one important resource our ancestors relied upon: filth. Or, more precisely, bacteria. The one thing humans cannot, as far as we know, obtain from plants nor manufacture within our bodies is vitamin B-12, as Dr. Lindsay Allen, the USDA employee who condemned vegan diets for children and nursing mothers as “unethical,” has pointed out.³⁶ Does this, then, suggest that our evolution requires the consumption of animal foods after all? That depends on how you define “animal.”

There are those that would assign the term “animal” to any organism capable of motility. But to a scientist membership in the Kingdom Animalia requires a multicellular body; bacteria fail that requirement and are consigned to the Kingdom Monera; some even classify bacteria as plants, of the Kingdom Plantae and the class Schizomycetes. And it is bacteria which are the original source of all vitamin B₁₂. If we consume the bacteria directly from fresh-picked fruits and nuts and tubers we’ve no need to acquire B₁₂ second-hand from animal flesh. But we might also acquire it from tiny bugs clinging unnoticed to the blackberries we pick, or, for that matter, I am told, to the fresh produce in a French open market.

Vegetarianism as a conscious choice (as opposed to a diet that was taken for granted, at least by our earlier ancestors) goes back at least to 600 B.C. and the mathematician Pythagoras, a vegetarian who is believed to have lived to be 80 or older. Other early vegetarians who flourished long before vitamins were discovered were Socrates, who lived to be about 71, Plato, who lived to be about 75, Virgil, who only made it to 51, Horace, 51, and Ovid, 60. This was in a time long before modern medicine, modern sanitation, or even the concept of germs. No doubt Socrates would have lived longer still had he not consumed one plant too many, that plant, of course, being hemlock. Considering that the average life expectancy in Ancient Greece was about 30²² it’s plain the lack of animal flesh did these gentlemen no harm.

Primitive vegan tribes have been observed doing very well without hamburgers or Flintstone vitamins in acquiring B₁₂. The Brok-Pa tribes of the Himalayan region around the villages of Gilgit, Hunza, Kargil and Leh are strictly vegan and are said to remain vigorous and active into their 90’s.³⁰

But urban man lacks the benefits as well as the drawbacks of lack of sanitation. It has been said that children in modern climate-controlled homes are often sickly and subject to numbers of allergies, their immune systems never having had to develop resistance to pathogens and allergens. But it is not necessary to test this thesis to assure that infants

are not deprived of B₁₂. Many of the mainstays of the vegan diet are fortified with B₁₂, including soy milk, cereals, yeast extracts, and textured vegetable protein and meat analogs, and vegetable and sunflower margarines.

Furthermore, B₁₂ can be stored in the body for many years, and B₁₂ deficiency is, thus, very rare.⁹ Adults store two to five milligrams in their bodies, 80% of this in the liver; from one to 10 micrograms a day are excreted in the bile and heterohepatically reabsorbed. Thus, one who lacks intrinsic factor, essential to absorbing B₁₂ in the digestive tract, will develop anemia much more quickly than one whose diet simply becomes deficient in B₁₂; the former might develop pernicious anemia in only three years whereas the latter might not show symptoms for twenty.¹⁰

It has not been demonstrated that pregnant women need extra B₁₂, though their serum levels are typically less than those of a non-pregnant woman; it decreases steadily during pregnancy, the mother's loss being the baby's gain. At birth the serum B₁₂ level of a full-term baby is much higher than that of its mother.²⁹ Among those mothers whose B₁₂ levels become low enough to result in frank megaloblastic anemia, a folic acid deficiency is at least as much of a factor as B₁₂ deficiency. In fact, in some cases studied by E. W. Ball and C. Giles, women suffering from megaloblastic anemia with B₁₂ serum levels of less than 100 µg/mL were restored to normal levels with folic acid therapy alone.¹²

The diet of vegans is considerably higher in folic acid than that of women eating an omnivorous diet wherein a substantial portion of folate rich foods is displaced by animal foods. As yet authorities have not specifically expressed concern as to whether mothers eating an omnivorous diet potentially deficient in folic acid might pose a threat to their unborn children. It is commonly recommended, though, that women of childbearing age supplement their diets with folic acid supplements, just to be on the safe side. Since megaloblastic anemia of pregnancy is also a danger to omnivorous mothers, and since excess doses of B₁₂ have not been shown to be harmful, perhaps B₁₂ should be added to folic acid as a vitamin to be taken prophylactically by all pregnant women. Most multivitamins contain an ample dosage of B₁₂; many also contain folate.

Thus, the risk of a B₁₂ deficiency in vegan mothers and children is easily remedied; however, one must ask: is there really a B₁₂ deficiency risk specific to veganism at all? As mentioned, studies done by those who themselves are meat-eaters must guard against the results being skewed by presuppositions. For example, if the serum levels of B₁₂ and other factors are measured against profiles based on subjects who eat meat, does a lesser reading really indicate a deficiency? Perhaps the meat-eaters have an excess. Dr. P. C. Dagnelie, Associate Professor of epidemiology at the Universiteit Maastricht, and others, writing in *Tijdschr Kindergeneeskde*, said, "Most studies report low intakes of vitamin D and in vegan and macrobiotic children also of calcium and vitamin B₁₂, but it cannot be excluded that some alternative sources of these nutrient may have been missed. Deficiencies have been described for vitamin D and B₁₂ but the evidence is often unconvincing. For example, exposure to sunlight has not been measured in most of the studies on rickets."¹⁵

Dr. H. Suzuki of the Department of Internal Medicine, School of Medicine, Keio University, studied a group of Japanese vegan children and an age-matched control group; the vegans' diet included seaweed called nori. The vegan children's serum vitamin B₁₂, red blood cell count, hematocrit, hemoglobin, and other data were determined in the laboratory. Dr. Suzuki found, "Not a single case of symptoms due to B₁₂ deficiency was found. There were no statistically significant differences between the two groups with respect to any of the examination data, including B₁₂ levels ($p < 0.05$)." Later researchers have cast doubt on the implication that the nori mentioned was the source of the B₁₂ for the vegan children; many question the bioavailability of cobalamin in algae and seaweed. Nonetheless, the validity of the results of this study has not been called into question.⁴¹

Vegans are constantly warned that B₁₂ can only be found in animal products. The source B₁₂ for the B₁₂ in those animal products is, as we've seen, actually bacteria. But it is not beyond the realm of possibility that the law that plants – and fungi – cannot, themselves, contain B₁₂ may not be absolute. In a series of experiments A. Mozafar demonstrated that, though they cannot synthesize vitamin B₁₂, plants including soybeans, barley, and spinach grown in soil enriched with B₁₂ or cow dung can absorb and retain in an unbound form significant quantities of B₁₂. Mr. Mozafar, writing in *Plant and Soil*, described the experiment: "This study looked at whether plants, specifically soybeans, barley, and spinach, grown on soils amended with pure B₁₂ or B₁₂ in manure would have a higher B₁₂ content than plants grown with inorganic fertilizers. All plants contained a minimal amount of B₁₂ in the inorganically fertilized soil. Barley showed a threefold increase of B₁₂ in the harvested grain in both the pure B₁₂ treatment (10.8 ng/g dry weight) and the manure treatment (9.1 ng/g dry weight). In spinach leaves, B₁₂ increased twofold in the manure treatment (17.8 ng/g dry weight) and 34-fold in the pure B₁₂ treatment (235 ng/g dry weight). Soybeans had a similar, but not as dramatic trend. In addition, soil samples in fields receiving manure over several years contained more B₁₂ than those only receiving inorganic fertilizers. These results show that B₁₂ levels can be increased in organically grown food through the use of manure fertilizers."³³

It is known that B₁₂ is produced in the human colon; however, we are unable to take advantage of this as B₁₂ is absorbed back at the terminal ileum, the most distal part of the small intestine. However, this B₁₂ produced in our colon was available to our ancestors prior to the discovery of the germ theory; human waste was often used to fertilize crops. Even prior to human agriculture it seems likely that this source of B₁₂ might well have found its way into our food supply simply by the route of what today we would regard as poor hygiene.

Furthermore, it is possible that assumptions about the availability of B₁₂ from our own intestinal flora may require reexamining. M. J. Albert and others writing in *Nature*, suggest that we may, after all, be able to derive B₁₂ directly from our own intestinal flora. "We now show that at least two groups of organisms in the small bowel, *Pseudomonas* and *Klebsiella* sp., may synthesize significant amounts of the vitamin."¹

Vitamin B₁₂ is the only vitamin which requires a trace mineral for its synthesis, cobalt. Herd animals, which routinely derive their B₁₂ from their own intestinal flora, do poorly in regions where the soil is geochemically deficient in cobalt, as it is in many parts of the

United States.³⁹ Is it possible that, to some degree, human B₁₂ deficiency actually results from a cobalt deficiency?

A Zogby poll in 2000 sponsored by the Vegetarian Resource Group, found that .09 percent of Americans are vegans (the margin of error was 5%). This would equate to more than two and a half million vegans in the country, a small number percentage wise, but a vast number epidemiologically.⁵ The effects of a B₁₂ deficiency can become quite dramatic, and it is hard to imagine that an epidemic of major childhood pathologies on this scale would have escaped public notice. Yet Brita C. Moilanen, MD, writing in *Pediatrics in Review*, says childhood disorders among vegans are uncommon. “Some people believe that patients following vegan or vegetarian diets suffer from nutritional deficiencies. Although there have been case reports of children failing to thrive or developing cobalamin deficiency on vegan diets, these are rare exceptions. Multiple experts have concluded independently that vegan diets can be followed safely by infants and children without compromise of nutrition or growth and with some notable health benefits.³²

Plainly, more truly objective studies would be helpful. But two things seem clear: dangers of wide-spread dietary B₁₂ anemia among vegans and their children are overblown, and, in the absence of widespread bacterial sources, a vitamin pill each day couldn't hurt.

But what of the other nutrients specified in Dr. Allen's jeremiad? She warned of . "Deficiencies of micronutrients such as vitamin A, B₁₂, iron, zinc, calcium and riboflavin." We might add vitamin D to her list, since that nutrient, also, is often listed as one not readily available to vegans and their children, as well as the single item most often assumed to be deficient in vegan diets, protein.

Whole books could be, and have been, written about each of these nutrients; I will seek here only to offer enough countervailing argument to show that vegan parents cannot be presumed to be depriving their children of these substances.

Let's start with the first of these, alphabetically: Vitamin A. It is true vitamin A can only be found in sources of animal origin. However, that does not mean we should meet our vitamin A requirements by that route. In fact, whole vitamin A can be toxic; for a while vitamins A and D could only be purchased in this country with a doctor's prescription. Fishermen are warned against consuming shark's liver, should they be so inclined, as the levels of vitamin A in a shark's liver can be lethal; the same goes for hunters and polar bear livers. Of greater concern to most of us, vitamin A supplements can be dangerous to children.

Hugh Simon Lam and others, writing in *Pediatrics*, cautions, “Parents should be warned about the dangers of excessive vitamin consumption. Clinicians should be aware of the late peak in serum retinol concentrations, which may lead to late complications of vitamin A overdose.”²⁸ Vitamin A is also dangerous in pregnancy: “In humans, malformations similar to those seen in animals have been recorded when women ingested high doses of preformed vitamin A and related compounds (particularly retinoic acid and analogues) in the first trimester.”²⁵ Fortunately, adult and child needs for vitamin A can be safely obtained from vitamin A precursors, the carotenoids, readily available in many

vegetable sources. There are about 50 carotenoids from which the human body can synthesize vitamin A; the most common is beta-carotene. In fact, vitamin A content of foods is now stated as retinol activity equivalents (RAE). To further complicate matters, requirements are sometimes listed as international units instead. One RAE of Vitamin A (in mcg) is equivalent to 6 International Units (IU) from beta-carotene, 10 IU from other carotenoid-rich plant foods, 4.10 IU from milk and yogurt, or 3.33 IU from animal sources and fortified foods.⁶

Women ordinarily require 700 RAE, 770 if pregnant and a significant 1300 if lactating. Still, these requirements can readily be met without turning to meat or dairy products. One obvious source is carrots; one medium carrot contains 1012 RAE. A medium baked sweet potato contains 1244, a canteloupe 1244. A delicious slice of pumpkin pie contains 660 RAE. Butternut squash has 857 RAE per half cup, a fresh mango 805, cooked spinach 739 per half cup, Cantaloupe 561 a cup, two apricots 366, and, collard greens and kale have around 500 RAE a half cup each, among other nutrients of special importance to vegans. Innumerable other sources could be listed, but these should suffice to show that we do not need to rely upon animal sources for our vitamin A.⁶

However, it should be noted that our bodies require the consumption of adequate dietary fat to utilize vitamin A, and that some substances, including iron and meats with nitrates, can interfere with its absorption. The Nutrition Factsheet of the Feinberg School of Medicine at Northwestern University states, "Because vitamin A is a fat-soluble vitamin, it must be incorporated into micelles in a bile-dependent reaction before it can be absorbed. Consequently, dietary fat must be consumed with sources of vitamin A to insure adequate absorption. Very low-fat intakes (<15% of total energy) reduce bioavailability of vitamin A. Intakes of mineral oil or commercial fat replacers (e.g., Olestra) inhibit vitamin A absorption by solubilizing the vitamin in nonabsorbable media. Other substances which may adversely affect vitamin A availability include high doses of ferrous sulfate (iron supplement), tannic acid (black tea), aspirin, and nitrates from processed meats."⁶

There are few dietary sources of vitamin D for vegans or for meat-eaters; the known sources are fatty fish, eggs (and then only if the chickens have been fed feed fortified with vitamin D), and, possibly, some mushrooms. Infants and children, Women, whether or not they are pregnant, and men all require 5 mcg a day, according to current guidelines; after the age of 51 we need more. However, the sufficiency of that allowance has recently been called into question. A study by Heany and others in Nebraska found that healthy male adults in good health needed about 12 mcg/day of vitamin D during the winter to maintain adequate vitamin D levels. They speculated that good health might require even higher intakes, well above the maximum of 50 mcg now recommended. The researchers stated, "[T]he evidence available today indicates that a value of [50 mcg/day] for the tolerable limit level is too low. ... [The] data presented here indicate an average daily need perhaps twice that much."²³

Conventional wisdom is that our vitamin D needs and those of our children can be satisfied in Southern climes by simple exposure to sunlight. Again, however, the

adequacy of that source in northern latitudes and even in the South, particularly in light of our modern, indoor lifestyles, is now in doubt. Furthermore, extensive sunlight exposure subjects us to increased danger of skin cancer, a drawback that may not have been selected against evolutionarily since Darwinian principles only require that we live long enough to reproduce.

Research done as part of the ongoing Nurses' Health Study suggests that vitamin D may actually be more important to our bone health than calcium, especially when intake is low, as it may be among vegans.¹⁸

It seems apparent that neither vegans nor consumers of meat and dairy products can take vitamin D for granted. Fortified soy milk, cereals, meat analogs and other products are available for vegans; non-vegans have long been accustomed to obtaining a major portion of their vitamin D from fortified cow's milk. Plainly, though, the danger of vitamin D deficiency is not peculiar to vegan children. Judicious use of vitamin pills might be in order for both groups.

Among other functions, vitamin D helps our children to utilize calcium to form their growing bones and to maintain good health of their nervous system. As we grow older we need increasing amounts of calcium with those over 50 requiring the most; children from one to three need about 500 mg a day, from four to eight they need 800 mg. Adult men and women need 700 mg, with breastfeeding women requiring an extra 550 mg. There are, again, numerous vegetable sources. A half cup of vitamin-A-rich collard greens, a plant that grows wild in East Tennessee, provides 178 mg of calcium compared to 150 mg in a half cup of cow's milk. Calcium in fortified soy milk or tofu is about the same as milk. Blackstrap molasses puts other sources to shame with 170 mg of calcium in a single tablespoon!² The calcium in kale, broccoli, collard greens, and soymilk is absorbed at about the same percentage as that in cow's milk. The calcium in plants containing oxalate, notably spinach, is not well absorbed since oxalates bind calcium. However, other plant nutrients often found with calcium in plant products improve its effect on growing bones: vitamin K in leafy greens; vitamin C, potassium, and magnesium in calcium-fortified orange juice; boron in beans, nuts, leafy green vegetables, and non-citrus fruits.⁴³ Calcium, in turn, inhibits iron absorption and should not be taken at the same time.

It is plain that society need not assume vegan children will be in danger of weak bones as a result of a calcium deficiency. However, the source of calcium that would first occur to most people, cow's milk, may not be as desirable as the plant sources vegans rely upon. Whole milk, of course, contains unhealthy levels of fat and cholesterol, but even skim milk is less than ideal; about 75% of the world's population is deficient in the enzyme needed to digest milk properly. The enzyme lactase is present in infants for digesting their mother's milk, but levels decline after the age of five years. Many infants, even if not lactose intolerant, develop allergies to milk proteins that may trigger other allergies.⁴² Also, consumption of cow's milk by toddlers has been linked to an increased likelihood of diabetes mellitus later in life. *The Merck Manual* states, "Exposure of infants to dairy products (especially cow's milk and the milk protein β casein), high nitrates in drinking water, and low vitamin D consumption have been linked to increased risk of type 1 DM."³ Feeding one's baby dairy products might not be considered child abuse, but it is plainly not in the child's best interest.

Iron is another nutrient strongly associated with foods of animal origin; it was once recommended that everyone strive to eat liver twice a week to be sure of getting enough iron. That was before nutritionists began to give more thought to the role the liver plays in removing toxins from the blood.

Dairy products not only provide no iron, milk can actually prevent the absorption of iron. *Essentials of Pediatric Nursing* states, “Cow’s milk is a poor source of iron and can displace more nutritional foods; 50% of iron-deficient infants fed cow’s milk have increased fecal loss of blood” The textbook also warns that children “under 12 mos. should *not* be given cow’s milk due to risk of mucosal damage to GI lining or allergic reaction to milk protein.” Wong points out that in infants “overweight” is not synonymous with its “healthy,” and that the notion of (cow’s) milk as the “perfect food” is a myth.²⁴ Infants fed breast milk or iron fortified formula usually have normal iron levels. Studies have shown infants often have depleted levels of iron when started on cow's milk at six months of age.⁴⁴ Vitamin C, on the other hand, will increase the absorption of iron. Also, vegetable (non-heme) sources of iron cooked in iron utensils will be more digestible.⁴ Iron utensils not only make the iron in foods cooked in them more digestible, they actually contribute to the iron content. Anne Field, Extension Specialist, Emeritus, with the Michigan State University Extension program, says “Nutritionists suggest that foods cooked in unglazed cast iron contain twice or more times the amount of iron they would contain otherwise.”¹⁷

Vegetarian children are no more at risk for iron deficiency anemia, which is the most common childhood nutritional problem in our country, than are the children of the meat-eating population. While meat contains heme iron that is better absorbed than the non-heme iron found in plant foods, iron deficiency anemia is no more likely to occur in vegetarian than non-vegetarian children. Good iron sources include whole or enriched grains and grain products, iron-fortified cereals, legumes, and green leafy vegetables. Consuming foods rich in vitamin C at the same meal enhances non-heme iron absorption.³¹ Of course, vegan children will not have the disadvantages relating to iron absorption that children who are given milk encounter.

Riboflavin (B2) is essential to the human body in releasing energy from proteins, carbohydrates and lipids. It may also play a role in the utilization of Vitamin B6 and in the conversion of tryptophan to niacin. There is no known deficiency disease specific to riboflavin, but approximately 1.7 mg for men and 1.2 mg for women is recommended. One of the most ubiquitous of vitamins, it is found in practically all foods, some of the best sources for vegans are yeast extract, wheat bran, peas, whole cereals, beans, lentils, nuts, mushrooms and avocados. Deficiencies in our country are rare and occur mostly in alcoholics and those with chronic diseases.

“The concentration of riboflavin is low in whole grains,” Dr. Moilanen observes, “so vegan children can benefit from substituting small amounts of enriched grains to increase riboflavin intake.”³² The Mayo clinic, on the other hand, on its Food and Nutrition website, argues that whole grains are a better source of nutrients including riboflavin,

which can be found in both the germ and the bran of unrefined grains.¹¹ Both whole and enriched grains, of course, are acceptable to vegans.

The last of Dr. Allen's concerns, alphabetically, is zinc. Among the many important functions of this trace mineral is supporting fetal development and normal growth during childhood. Thirteen mg of zinc is recommended during pregnancy, 14 during breast-feeding. Children up to the age of three need two mg. gradually increasing to eight from 9 to 13 years of age. Good sources of zinc include peas, beans, brown rice, spinach, green vegetables, nuts, tofu, and tempeh, lentils, pumpkin seeds, brewers yeast, and tofu. Far and away the richest source of zinc in food is oysters with 16 mg; just short of that is enriched breakfast cereal with 15. Both provide the minimum requirements of a grown man or a pregnant or lactating woman in one serving. Most other vegetable sources – and most meat sources, for that matter – lag far behind. Requirements can be met with vegetable sources, but, since modern man cannot spend the day browsing, a supplement is advisable. Dr. Moilanen comments, “Zinc supplementation may be required in vegan infants as they transition to solid foods. Zinc levels in human milk decline throughout lactation, but as nonvegan infants make the transition to solid foods, they usually obtain sufficient zinc from these sources. Vegan infants, however, usually have an increased intake of phytate, found in whole grains and legumes, which reduces the bioavailability of dietary zinc. Zinc bioavailability can be improved by choosing fermented soy products such as tempeh and miso or yeast-leavened whole grain breads.”³²

Finally we come to the nutrient most likely to elicit concern in the vegan's meat-eating friends and acquaintance and to provoke the all-too-familiar question, “But where do you get your protein?” Some sources, such as *Biology for Dummies* by Donna Rae Siegfried³⁷ even state that there are some amino acids only found in meat.* But that's not true. The American Dietetic Association has published a position paper on Vegetarian Diets that “reviews the current scientific data related to key nutrients for vegetarians, including protein, iron, zinc, calcium, vitamin D, riboflavin, vitamin B-12, vitamin A, n-3 fatty acids and iodine.” Their conclusion: “A vegetarian, including vegan, diet can meet current recommendations for all of these nutrients.”

But what about the “carefully planned” aspect that many texts warn about so solemnly? Are busy parents really going to study nutrition and carefully weigh out portions of complementary proteins in able to construct a meal fully adequate in protein? Happily, they don't have to. The same paper addresses the issue of combining proteins: “Plant proteins meet requirements when a variety of plant foods is consumed and energy needs are met. Research indicates that an assortment of plant foods eaten over the course of the day can supply all essential amino acids and ensure adequate nitrogen retention and use in healthy adults; thus complementary proteins do not have to be eaten at the same meal.”

Adults, yes, but what about children? That depends, in part, on the types of proteins in question; plants differ in the bioavailability of their proteins. Again from the same paper: “Based on the protein digestibility corrected amino acid score (PDCAAS), which is the standard method for determining protein quality, isolated soy protein can meet protein needs as well as animal protein, whereas wheat protein eaten alone, for example, may be 50% less usable than animal protein.” Depending on which plant sources make up most

of a their diet, vegan children might need to consume slightly more protein than a non-vegan child's minimum requirements. However, that presents no real problem in North America where food is plentiful and nearly everyone gets far more protein than they require. "[T]hese protein needs are generally met when diets contain adequate energy and a variety of plant foods."³⁴

Point by point it can be shown that there are no deficiencies in the vegan diet that would place the children of vegan parents at risk. Concerns have also been raised that the vegan diet might have at least one excess feature: too much fiber. This apprehension, on the face of it, seems almost laughable, a concern that vegan children may be eating too many apples and rutabagas and neglecting consumption of ice cream and potato chips. Still, it is conceivable that a child who was overly zealous in eating all his vegetables – a hypothetical child, to be sure – might take in enough fiber to interfere with the digestion of other nutrients, particularly minerals.

The matter has not been definitively settled, but indications are that high fiber diets pose no threat to vegan children. Lewis A. Barness and others, writing in the journal *Pediatrics* acknowledged more research should be done. "However, limited results from metabolic work suggest that moderate amounts of dietary fiber do not significantly affect mineral status. A study was done in 1943 on children 4 to 12 years old who consumed from 4 to 6 gm of crude fiber (cellulose and hemicellulose) per day for periods ranging from 30 to 225 successive days. The authors report that all children enjoyed buoyant health, satisfactory bowel elimination, and no evidence of any untoward effects upon the absorption of nitrogen and the mineral elements."¹³ In fact, as we might expect, high fiber diets appear to protect children from many diet-related problems encountered all too frequently in our fast-food nation: "Current interest in fiber was stimulated by the suggestion that it might help to prevent certain diseases common in the United States, namely diverticular disease, cancer of the colon, irritable bowel syndrome, obesity, and coronary heart disease. African blacks in rural areas where the fiber intake was high rarely had these diseases; however, during the past 20 years as this population moved to the cities and adopted Western habits (including a Western diet), they began to suffer from the same "Western-type" diseases."¹³

Which points up one aspect of the frequent challenges to vegetarian parenting; the fact that these misgivings always fail to consider the ways in which a vegan diet might actually be superior in meeting a child's health needs than the standard American diet, perhaps even far superior. To ignore this aspect is rather like warning that one who jogs regularly is in greater danger of being struck by a car than one who spends all his free time sitting safely at home watching television.

Most warnings against a vegan diet for children are parsed with words like, "may be at risk for," and "are likely to be deficient in," but it seems many who make pronouncements about unfamiliar dietary practices are basing their opinions not on actual studies or experiments or epidemiological surveys but upon hypotheses as to which nutrients seem to them more likely than not to be problematic, their awareness that most people, probably including their own families, eat meat and do okay, and the fact that there are isolated cases of parents who do follow bizarre and ill-advised dietary practices that are harmful to their children, based on religious beliefs or, in some cases, on

convictions that they hold with religious zeal. Most studies of the harm inflicted by parents upon supposedly vegan children focus on families far outside the vegan mainstream, like the woman in the news item mentioned earlier who refused to give her child breast milk (statistically vegan mothers are more likely than average to breast-feed), the mother who was feeding her child a strange formula including cod liver oil, plainly not a vegan practice, and macrobiotic and raw food practitioners who, again, are not part of mainstream veganism. In fact, the macrobiotic diet in its original form (called Zen Macrobiotics until Zen practitioners objected as the practice had no foundation in Zen beliefs) was said to be responsible for many deaths.

With their pre-convictions firmly fixed some nutritionists will seize on any opportunity to exclaim, “Aha!” A study was done on The Farm, a commune in middle Tennessee whereon the children are raised as vegans. ^[Appendix B] Some nutritionists seized on the finding that the heights and weights of the children were below average. That was true. By age ten children from The Farm averaged a full 0.7 cm and 1.1 kg less than the reference median. That would be 0.1 and 0.3 standard deviations from the reference. In other words, insignificant. And, of course, we aren’t told what the average height of the parents was. Consider, as one possibility, that parents who were themselves small, perhaps “picked on,” might develop more empathy for animals and tend toward a vegan diet for ethical reasons.

Roberts and others in the article that suggested the title of this paper³⁵ warned that “Children reared in this way have depressed growth rates up to the age of two years, suggesting suboptimal nutrition.” In the limited studies available it does seem that vegan children have a lower growth velocity in their earlier years, but then catch up. Is this really an indication of “suboptimal” nutrition, or does it represent, in fact, a more normal course of growth, perhaps free of the effects of growth hormones given to meat animals to get them to the market sooner. Vegan girls also have a later menarche. Is this, too, a sign of a diet deficiency, or, again, a healthier rate of maturation, perhaps, again, relating to growth hormones in meat? Vegan women are less likely to have twins; is that a sign of a lack of fecundity or, since bearing twins is considerably more dangerous than singleton births, does this represent a healthier and more natural development?

It has also been shown that vegan children tend to have more endurance but less muscle than the children of meat-eaters. But is this because of aspects of the two diets, or could it be that parents who choose veganism also place less emphasis on their children excelling in strength sports? Much study remains to be done on comparative diets before we, as a society, jump to any conclusions as to what constitutes the ideal diet for all children. For now, it seems the question of the safety of a vegan diet for children is like the mystery solved by Sherlock Holmes by the clue of the dog who didn’t bark: with some two and a half million vegans in this country, the lack of a vegan crisis suggests most vegan families are doing just fine without nutritional supervision.

The organization People for the Ethical Treatment of Animals has recently posted billboards in Britain with the headline “Feeding Kids Meat is Child Abuse.” Considering the epidemic of child obesity, childhood type 2 diabetes, higher blood pressure, heart rate and cardiac output, pulmonary disorders, food allergies and such deficiencies as “milk anemia,” orthopedic problems related to weight stress, skin disorders, weakened immune systems and issues of poor self-esteem, negative self-image, depression, and

withdrawal related to being overweight, to say nothing of the effects of an omnivorous diet on the child's future health (such as the role cow's milk plays on developing diabetes mellitus later in life), we might well ask: Is it possible for a child to receive adequate nutrition on a meat-and-dairy centered diet. The answer would seem to be, yes, it is possible. But only if it is well planned.

* The publisher has promised to correct this misstatement in future editions.

Is Vegetarianism a Form of Child Abuse?

Bibliography

1. Albert, M. J, V. I. Mathan, S. J. Baker. "Vitamin B12 synthesis by human small intestinal bacteria." *Nature*, Macmillan Publishing Group, Hampshire. 1980 Feb 21;283 (5749):781-2.
2. Author unknown. "Food Sources of Calcium and Vitamin D." British Columbia Ministry of Health. [Online] Available <http://www.bchealthguide.org/healthfiles/hfile68e.stm>. November 2005.
3. Author unknown. "Diabetes Mellitus (DM)." *The Merck Manual*. Merck Research Laboratories, Division of Merck & Co., Inc., Whitehouse Station, N.J. 2007
4. Author unknown. "Dietary Sources of Iron." McKinley Health Center, [University of Illinois, Urbana Champaign](http://www.mckinley.uiuc.edu/Handouts/dietary_sources_iron.html). [Online] Available http://www.mckinley.uiuc.edu/Handouts/dietary_sources_iron.html. December 2006.
5. Author unknown. "How Many Vegetarians Are There?" *Vegetarian Journal*, The Vegetarian Resource Group, Baltimore. [Online] Available <http://www.vrg.org/journal/vj2000may/2000maypoll.htm>. May 2000.
6. Author unknown. "Nutrition Fact Sheet: Vitamin A." [Northwestern University](http://www.feinberg.northwestern.edu/nutrition/factsheets/vitamin-a.html), Chicago. [Online] Available <http://www.feinberg.northwestern.edu/nutrition/factsheets/vitamin-a.html>. 2006.
7. Author unknown. "The Jackson Four; Apparent Victims of Attachment Therapy" [Online] Available <http://www.childrenintherapy.org/victims/jackson.html>, 2003.
8. Author unknown. "Vegetarians are Evil." [Online] Available <http://www.vegetariansareevil.com/>, 2007.
9. Author unknown. "Vitamin B12." *MayoClinic.com*, Mayo Foundation for Medical Education and Research (MFMER). [Online] Available http://www.mayoclinic.com/health/vitamin-B12/NS_patient-vitaminb12, Aug 1, 2005.
10. Author unknown. "Vitamin B12." The Vegetarian Society of the United Kingdom, Cheshire. [Online] Available <http://www.vegsoc.org/info/b12.html>, 2007.
11. Author unknown. "Whole grains: High in nutrition and fiber, yet low in fat." *MayoClinic.com*, Mayo Foundation for Medical Education and Research (MFMER). [Online] Available <http://www.mayoclinic.com/health/whole-grains/NU00204>, Aug 1, 2005

12. Ball, EW, Giles C. "Folic acid and vitamin B12 levels in pregnancy and their relation to megaloblastic anaemia." *J Clin Pathol*. 1964 Mar; 17 (2): 165–174, British Medical Journal Publishing Group, London. 1964.
13. Barness, Lewis A., Peter R. Daliman, Homer Anderson, Platon Jack Collipp, Buford L. Nichols, Jr, W. Allan Walker, Calvin W. Woodruff, Betty E. Anderson, Philip L. White, Mary C. Egan, Margaret Cheney, Claude C. Roy, Melinda Moore, Joginder Chopra, Myrtle L. Brown, Herbert P. Sarett, Thorsten J. Fjellstedt, L. J. Teply, Eileen Kennedy, Wffliam J. Darby, Peter Lewy, Rudolph M. Tomarelli, John D. Benson, George A. Purvis, Jerome Licari, Haines B. Lockhart and Sidney Saperstein. "Plant Fiber Intake in the Pediatric Diet." 1981;67;572-575 *Pediatrics*. American Academy of Pediatrics, Elk Grove Village. 1981.
14. Camacho, Frank. "Couple says Vegan lifestyle is responsible for children's condition." KTVK-TV, Tucson. [Online] Available <http://www.fox11az.com/news/topstories/stories/kmsb-20070313-famjc-veganchildabuse.d334275.html>, March 13, 2007.
15. Dagnelie PC, Van Staveren WA, Hautvast JG. "Health and nutritional status of 'alternatively' fed infants and young children, facts and uncertainties." *Tijdschr Kindergeneeskd*. 1985 Dec;53(6):208-16.)
16. France, David. "Hell House Revisited." *New York Magazine*, New York. [Online] Available <http://www.davidfrance.com/article.asp?ID=1>, November 22, 2005.
17. Field, Anne. "Cookware Today." Michigan State University Extension, Lansing. [Online] Available. <http://web1.msue.msu.edu/imp/mod02/01500616.html>. June 2006.
18. Feskanich D, Willett WC, Colditz GA. "Calcium, vitamin D, milk consumption, and hip fractures: a prospective study among postmenopausal women." *Am J Clin Nutr*. 2003 Feb;77(2):504-11. The American Society for Nutrition. Bethesda, MD.
19. GRADO, GARY. "Accused E. V. vegan couple's child died earlier." *East Valley Tribune*, Phoenix. [Online] Available <http://www.eastvalleytribune.com/index.php?sty=50179>, October 10, 2005.
20. Graham, Jessie. "Vegan Couple Starved Toddler, Cops Say." *New York Post*, New York. [Online] Available <http://www.foxnews.com/story/0,2933,51494,00.html>, April 30, 2005.
21. Grinberg, Emanuella. "Vegan couple cleared of starving baby, guilty of child neglect." [Online] Available <http://www.cnn.com/2005/LAW/11/08/child.starved/index.html>, 2005.
22. Guiseppi, Robert A. *The Glory That Was Greece*. [Online] Available http://history-world.org/ancient_greece.htm, 2001.

23. Heaney, R. P., K. M. Davies, T. C. Chen, M. F. Holick, M. J. Barger-Lux. "Human serum 25-hydroxycholecalciferol response to extended oral dosing with cholecalciferol." *Am J Clin Nutr.* 2003 Jan;77(1):204-10. The American Society for Nutrition, Bethesda, MD. 2003.
24. Hockenberry, Marilyn J., David Wilson, Marilyn L. Winkelstein. *Wong's Essentials of Pediatric Nursing*, p. 943. Elsevier Mosby. St. Louis. 2005.
25. International Vitamin A Consultative Group. *Safe Doses of Vitamin A During Pregnancy and Lactation*. ILSI Research Foundation, Washington, DC. June 1998.
26. Kiefer, Michael. "Vegan found guilty of child abuse." *Scottsdale Republic*, Scottsdale. [Online] Available (<http://www.azcentral.com/news/articles/0410onl-parker0410-ON.html>, Apr. 10, 2007.
27. Ladewig, Patricia A., Marcia L. London and Michele R. Davidson *Contemporary Maternal-Newborn Nursing Care*, page 282. Pearson Education, Inc., Upper Saddle River, NJ. 2006
28. Lam, Hugh Simon, MRCPCHa, Chung Mo Chow, MRCPCHa, Wing Tat Poon, MBChBb, Chi Kong Lai, MScb, Kwan Chee Allen Chan, FRCPAc, Wai Lan Yeung, MRCPa, Joannie Hui, MRCPa, Albert Yan Wo Chan, MDd and Pak Cheung Ng, MD. "Risk of Vitamin A Toxicity From Candy-Like Chewable Vitamin Supplements for Children." *Pediatrics* Vol. 118 No. 2 August 2006, pp. 820-824 (doi:10.1542/peds.2006-0167). American Academy of Pediatrics, Elk Grove Village. 2006.
29. Lowenstein, L., M. Lalonde, E.B. Deschenes, L. Shapiro. "Vitamin B12 in pregnancy and the puerperium." *Am J Clin Nutr* 1960; 8: 265-75. 1983; 23: 93-140.
30. Menon, Murli. "A Secret the Himalayas hold." *The Hindu Business Line*. [Online] Available <http://www.thehindubusinessline.com/life/2005/01/07/stories/2005010700080200.htm>. 2005.
31. Messina, M. and V. Messina *The Dietitian's Guide to Vegetarian Diets: Issues and Applications*. Gaithersburg, MD: Aspen Publishers, Inc.;1996.
32. Moilanen, Brita C., MD. "Vegan Diets in Infants, Children, and Adolescents." *Pediatrics in Review*. 2004; 25: 174-176. American Academy of Pediatrics, Elk Grove Village. 2004.
33. Mozafar, A. 1994. "Enrichment of some B-vitamins in plants with application of organic fertilizers." *Plant and Soil* 167:305-311.
34. "Position of the American Dietetic Association and Dietitians of Canada: Vegetarian Diets." *Journal of the American Dietetic Association* 2003;103:748-765. 2003.
35. Roberts, I. F., R. J. West, D. Ogilvie, and M. J. Dillon "Malnutrition in infants receiving cult diets: a form of child abuse." *British Medical Journal*, BMJ Publishing Group Ltd, BMA House, Tavistock Square, London February 1979.

36. Roberts, Michelle. "Children 'harmed' by vegan diet." BBC News. [Online] Available <http://news.bbc.co.uk/1/hi/health/4282257.stm>. February 2005.
37. Siegfried, Donna Rae. *Biology for Dummies*. Hungry Minds, Inc., 909 Third Avenue, New York, NY. 2003.
38. Smeltzer, Suzanne C., Brenda G. Bare, Janice L. Hinkle and Kerry H. Cheever. *Brunner and Suddarth's Textbook of Medical-Surgical Nursing*. Lippincott Williams and Wilkins, Philadelphia. 2006.
39. Smith, R. & Cobalt, M. *Trace Elements in Human and Animal Nutrition*, 5th Edition. Ch. 5 (editor: Mertz W.) p. 143-184. San Diego, Academic Press. 1987.
40. Sussman, Robert W., and Donna Hart. *Man The Hunted: Primates, Predators, and Human Evolution*. Westview Press, New York. 2005
41. Suzuki, H. "Serum vitamin B12 levels in young vegans who eat brown rice." *Journal of Nutritional Science Vitaminol*. Tokyo. 1995 Dec;41(6). 1995.
42. Wal, J. M. "Bovine milk allergenicity." *Annals of Allergy, Asthma & Immunology*. 2004 Nov;93(5 Suppl 3):S2-11. The American College of Allergy, Asthma, & Immunology, Arlington Heights, IL. 2004.
43. Wardlaw GM. *Perspectives in Nutrition, 4(th) Ed*. McGraw-Hill. Boston. 1999.
(<http://www.bchealthguide.org/healthfiles/hfile68e.stm>)
44. Committee on Nutrition. "The Use of Whole Cow's Milk in Infancy." *Pediatrics* Vol. 89 No. 6 June 1992, pp. 1105-1109. *Pediatrics*. American Academy of Pediatrics, Elk Grove Village. 1992.