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NATURE BY DESIGN

Plant Reproduction Strategies and the Paleo Diet

In explaining the Paleo diet to a novice, it often helps to use Mother Nature as a guide. We can observe her at work, as well as the strategies she has put in place to ensure the ongoing success of all her organisms' genetic material. These strategies include both positive and negative reinforcements on the parts of plants and fungi as they distribute nature's bounty to the animal world while furthering their own viability as a species by self-sacrifice or obvious toxicities.

With great credit given to Michael Pollan for reversing our egocentric view of human beings as the directors and distributors of plant-based food materials and their genes, in the same vein, one must also address the innate "knowledge" of plants and fungi and how they are designed for their desirability of consumption—or to mechanically and chemically defend against their ingestion.

Here we're going to group edible plant materials according to the major "admonitions" associated with the Paleo diet rules.

GRAINS—Family *Poaceae*—The Grass Family

All grains are seeds, intended to convey genetic information into the next generation of the species and thus, anthropomorphically, to want the best possible chance of being deposited on the best medium for growth—usually fertile soil with optimum moisture and light conditions. To this end, using wheat as a model, a grain will typically have an outer bran layer consisting of an outer pericarp to protect the seed and an inner layer to control water intake by the seed (or "germ"), which consists of the embryo of the future plant and the endosperm, the starch-storing part we usually associate with the food value of the grain. The endosperm is intended as the food source for the developing embryo as the seed germinates. Remember playing with wild wheat or oats as a child? There wasn't much endosperm in those seeds. What we are eating now are genetically designed grains bred for endosperm size and controllable gluten content, which is often seriously high in the case of bread flours.

In addition to the above, grass flowers called spikelets (or what we commonly refer to as "foxtails") have silica in their cellular structures that can cause wounding, abrasion, or outright penetration and one-way travel through animal tissues, especially if the animal is attempting to eat the flowers in their natural state. Spikelets are designed to facilitate animal dispersal by getting caught in animal coats and then being deposited remotely—but certainly *not* by being consumed, as that would cause choking on the part of the animal, and death to the seed. All of our edible grains have these flowers, although their appearances can vary greatly. Of course, the civilized thing to do with these plants is to mechanically process the obvious dangers away but, alas, the grain has even more defenses, as we will see below.

As an added discouragement to being eaten, above and beyond that provided by the spikelet's mechanical deterrence, Nature has a second chemical defense up her sleeve—one that's very insidious and ignored by the vast population of the unenlightened, non-Paleo world. In fact, some individuals seek out the gut irritation that indigestible bran fiber provides to aggravate the intestinal lining, and have become addicted to the effects of an insulin response to the huge starch intake (remember, starch is made up of glucose molecules strung together and is thus very easily broken down into sugar).

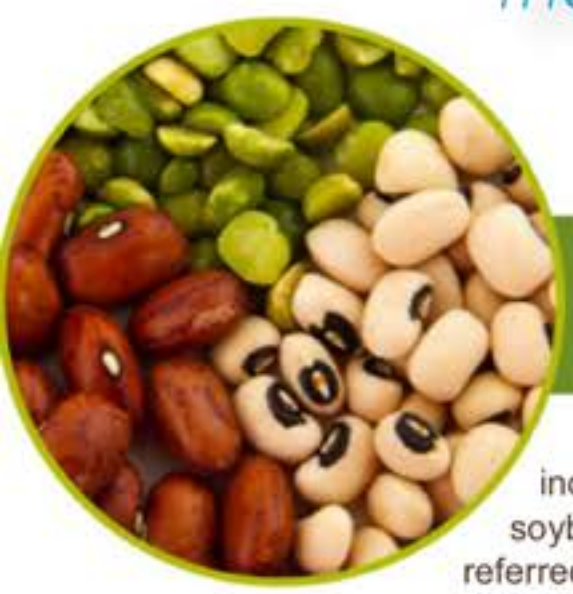
These same people often ignore the anti-nutrient and toxic properties present especially in "healthy" whole grains—specifically gluten, phytates and lectins.

The recent glut of anti-gluten literature should convince most people that gluten sensitivity is a general human condition. Phytates act as anti-nutrients, binding vitamins and minerals and causing them to be unabsorbable by the gut. Lectins are generally toxic to the epithelial cells of the gut lining and prevent repair of minor damage, leading to a leaky gut. They are also anti-nutrients and can cause immune reactions. Though these components will not kill you quickly, they cause debility over a longer period and slowly decrease your genetic viability.

It is my opinion that grains should be left to the very successful creatures that interact with them naturally and have physiologies adapted to their consumption. These would be rodents, birds, insects and fungi.

Text

"Mother Nature specifically colors and aromatizes these seeds for massive attraction to animals, including human beings."



LEGUMES–Family *Fabaceae*–The Bean Family

The usual list of "edible" legumes includes peas, lentils, beans, lupines, carob, soybeans, peanuts and tamarind. Sometimes referred to as pulses if they are grown primarily for their food value, one of the distinguishing characteristics of this family of plants is their ability to fix atmospheric nitrogen into a usable form for plant growth (thanks to symbiotic bacteria in the plants' roots).

With legumes, it is a bit harder to generalize as to their toxicity or nutrient value—but again, let's review Mother Nature's design for reproduction of these plants. Many of the "edible" legumes have a "vining and trailing" habit; they run low to the ground. With the exception of beans, alfalfa and the recently popular pea sprouts, human beings are primarily interested in the seeds and seed pods (fruits) of this family of plants. The legume pod typically splits open on two of its sides to either allow the seeds to drop or sometimes to be expelled with some force. These traits do not beg the animal kingdom to consume the seeds as part of the plants' reproductive strategy.

Unmentioned so far is the flavor of the mature pulse. If you have ever eaten too ripe a pea from your summer garden, you may have been surprised at the extreme bitterness, hardness and general unpalatability of the item. The same goes for the rest of the family. There are also many legumes not listed as food items that are known to be toxic, including sweet peas, non-edible lupines and wisteria. In fact, it has been estimated that the raw consumption of a handful of kidney beans can be fatal to an adult due to the toxins.

We see again, as with grains, that there is an obvious deterrent to the consumption of legumes based on immediate fatal toxicity, flavor, collectability, and the simple truth that a trip through an animal's digestive system will do nothing to further the plant's ability to reproduce (unless it is so tasty and delicious that it has actually trained us to spread its seed—nods again to Michael Pollan).

Beyond these initial deterrents, we again see insidious toxicities in the form of lectins and phytates. Although there may be some beneficial effects from phytates, I will leave that to another article, since we are addressing Mother Nature's "intent" for reproduction of plants. Fortuitously, the toxic load of many legumes can be reduced quickly to nontoxic levels by soaking and cooking. Their long-term toxicity must be questioned, though, along with the effect this toxicity has on a human being's genetic viability, as well as legumes' relatively high carbohydrate load, which can lead to insulin resistance. If one is hoping to get their high-quality protein via legumes, it will not be found in a plant in any concentration approximating that of animal protein.

As a humorous aside, how can we forget the other immediate effect of legumes—bloating and flatulence? The indigestible carbohydrates in the bean are very easily digested by gut flora, with the production of the familiar byproducts.

Peanuts and soy should be singled out, especially, for their toxic qualities. In the case of both plants, the phytic acid and lectin load is extremely high and has been linked to atherosclerosis. Peanuts are very susceptible to aflatoxin contamination from fungi (a potent carcinogen), with "allowable" levels present in products sold on shelves. I think Mother Nature did not want those to be eaten. And do you wonder why Japanese edamame are translated as "edible soybeans"? It is because the soybeans that are made into soy-based products such as textured vegetable protein or tofu are completely inedible and must be processed extensively for consumption—and they are still toxic due to elevated phytates and lectins. One can write them off, anyway, due to pesticide residues that include glyphosate, a potent toxin for healthy gut flora.

Now an example of Mother Nature encouraging animal consumption of seeds…

BERRIES & Archaic Fruits–Various Families

The seeds in this group are encased in a fleshy, delicious, non-toxic pericarp or fruit that Mother Nature intends for consumption. The difference between fruits and the aforementioned plants is marked. Mother Nature specifically colors and aromatizes these seeds for massive attraction to animals, including human beings. There is no arguing that when eaten in clusters as Mother Nature presents them, these seeds intend on sacrificing a few of their seed-mates for the good of the rest. The seeds that aren't eaten are designed to survive an animal's digestive system—and in fact, to sometimes be potentiated by it—and then be deposited in a pre-fertilized mass for optimum reproductive chances. It is quite obvious how easily berries are spread by animals, and their intense flavor, combined with their relatively low sugar content, makes them a desirable food.

In the case of apples and stone fruits, the contents of the toxic seed are not easily accessed unless by intent. Archaic forms of these fruits are not particularly palatable, either.

Nature's secondary benefit to eating these plant materials is their vitamin and nutrient density. Many of the pigments in fruits are important antioxidants, and their vitamin content blows grains and legumes out of the water!

So do you think Mother Nature wants you to eat these foods? Yes, seasonally and when in abundance, just as she intended.

Do you still want to challenge Mother Nature on her ultimate design?

Paul F. Campion, MD is currently president of Cenegenics California, an age management medical practice. His experience with plants and horticulture stems from childhood volunteering in the local botanic gardens, culminating in the ownership of PAONIA, a specialized peony nursery. He is a graduate of UCLA and completed his post-graduate and post-doctoral training at the George Washington University in Washington, D.C.