~Vanessa Silvas

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# Mighty Morphing Dinner Plates?

The world today is fast-paced, and our way of thinking is evolving at an extreme rate. Developing countries are starving, while developed countries are fighting obesity from overconsumption. Our population is increasing, along with the demand for food, which leads to the need for a major decrease in our ecological footprint on Earth. With this observation, new developments in genetic modification of plants and animals bring something completely new to our dinner plates. What is genetic modification really, and why are we not focusing on the natural production of plants for the future of our world's meals?

Jennifer A. Thomson, professor of Microbiology at the University of Cape Town, South Africa and author of Seeds for the Future, explains that conventional plant breeding is possible, though it is success or failure, leisurely, and a lot of work (1-4). The introduction of genetic modification speeds up the growing process by using specific genes from different organisms, which gives a plant traits that aren't normal. There are genetically modified (GM) herbicide-tolerant crops as well as virus-resistant and drought- tolerant crops. Thomson explains that the first GM herbicide-tolerant crops were introduced in 1996, called "Roundup Ready soybean," Roundup being "Monsanto's trade name for glyphosate, a broad-range herbicide that is practically non-toxic to organisms other than plants" (40). Though "Virus-resistant papayas" have had a positive effect, "Virus-resistant potatoes" have not been researched in the field fully; virus-resistant maise and cassava, as well as drought-tolerant crops are currently in "developmental stages" (53-61).

The method of this new breed of crop is otherwise known as "horizontal gene transfer," or HGT, meaning the product plant was not reproduced naturally through pollination and seeds from a "parent plants" original genetic makeup (Thomson 101). Thomson explains "HGT from GM plants to bacteria, either in the plant environment or in the intestinal tract of animals and humans ingesting them" relies on a multitude of elements, including "the availability of the DNA, mechanisms for its uptake, and establishment and expression of the transferred DNA in the" human or animal (105). Does this mean we must live in fear that consuming GM plants will introduce foreign bacteria to our internal system? The author explains that the likelihood of this transfer is minimal when compared to direct contact of the bacteria's origin (102-105). How do we be certain that there are no longer-term effects, lying dormant in our systems and waiting to erupt, from regular or overconsumption of GM plants?

C. Neal Stewart, Jr., Ph.D., author of Genetically Modified Plant, and holder of the Ratcheff Chair of Excellence in Plant Molecular Genetics, explains that the information the media releases to the public, and what is fully factual, are disconnected. Those of us who are uneducated on this subject seek the bits of information gleaned from outside sources. Are we being shown every side to every story in this matter? Stewart explains that among the multitude

of "potentially negative effects," either confirmed or argued, in the environment, have overshadowed the astonishing and awe-inspiring "environmental benefits of today's GM crops" (195). In fact, Stewart clarifies that the thirty-eight trillion genetically modified plants that America houses today have actually improved the environment both "directly and indirectly" (195). So what are some of these benefits? Stewart gives the example of pesticides. GM plants contain pest-fighting genetic traits; directly, this leads to decreasing usage of pesticides, which in turn leads to less soil erosion from runoff into bodies of water (195). This runoff contained pesticides such as Roundup, produced by Monsanto, which is also the patent holder of genetically modified corn and soybean seeds. Is there something more to the relationship between these two products, and where will this development in GM plants ultimately lead us in these fast-track environmental fixes?

Globally, we are now in the beginning stages of genetically modifying animals, such as salmon. Timothy Egan, part of a Pulitzer Prize-winning team and Pacific Northwest correspondent/ national enterprise reporter for the New York Times, explains the process to create this so-called "Frankenfish" is to "take the Chinook gene and splice it into a farm-raised Atlantic. A third fish, an ocean pout, which looks like an eel on a bad fin day, would provide the genetic code that allows AquAdvantage Salmon to grow so fast. Voila: fast fish from the factory, without the hassle of habitat preservation." Egan explains that wild salmon is a tedious fish to care for, stating they require "clean water, a bountiful ocean and restraint to ensure that they aren't fished out of existence." Wouldn't it be just as effective to start protecting a natural and ancient species' habitat, rather than splicing a bunch together to make an entirely new and foreign one? Alaska has proved triumphant in its efforts to protect wild salmon by maintaining their water quality and regulating its fishermen (Egan). As with any introduction of a new scientifically created product there are also future possible health and well-being concerns, for human and nature alike. "These new salmon, AquaBounty says in its pleadings before the government, will not harm the ones handed down by the ages. There is "virtually no possibility of escape and interaction with the wild population," company officials say" (Egan). The fact that this is the first we are seeing of a genetically modified animal leads to an, unsurprisingly, ample amount of questions and concerns. First, there was a worry of the effects of soil born bacteria on humans and animals. Now what worries will arise, what health risks might there be, and how are we to be sure that AquaBounty is providing us with the whole truth and nothing but about genetically modified products?

Odd and interesting links are immensely apparent through examination of this subject. Jill Richardson, founder of blog La Vida Locavore, member of the Organic Consumers Association policy advisory board and author of, best seller, Recipe for America: Why Our Food System is Broken and What We Can Do to Fix It, states "The FDA is regulating the GE salmon as a "New Animal Drug," in agency terminology, and it is thus being evaluated by a special Veterinary Medicine Advisory Committee (VMAC)." Of the ten members of this committee, eight are vets, and with a concern of the lack of experts on the committee who have knowledge on "genetic engineering and fish, the FDA added four "temporary voting members""" (Richardson). One of these temps being Alison L.. Van Eenennaarn, a previous Monsanto employee currently employed as a cooperative extension specialist in animal biotechnology and genomics.

Richardson notes Van Eenennaam is known for her open support for genetically engineering animals, and even has a YouTube video, called "Animal Biotechnology" in which she compares the process of "genetic engineering and cloning to traditional animal breeding, artificial insemination, and in vitro insemination, as if they were all equally benign "biotechnologies."; on top of this, she happens to be more experienced with cows than

fish. The additional three temporary voting members include another genetic engineering expert with more knowledge of cows, accompanied by one fish expert, and, most confusing, a lawyer. Richardson also reveals the urgency of approval the FDA expresses. Are we to believe this ensemble of experts is keeping mankind's best interests the main focus in this rapid decision of approval?

The film Fresh sheds light on an issue that leaves undertones of déjà vu like quivers. Fresh, a documentary focused on uncovering the truth about industry-controlled farms, follows the stories of real farmers who have operated under and witnessed firsthand the subliminal intentions of big businesses. Many of these farmers no longer participate with these corporations; they have no fear of consequence, no fear of judgment, and no fear of relinquishing cold, hard truth. Joel Salatin, a sustainable farmer in Swoope, VA, and former industrial farmer, is proof that food can be raised without the use of any industrial food system. He put this method to the test, stating the income grew along with the increase of positive ecological effects, bio diversity, and "all without any fertilizers or industrial products" (Salatin (Fresh). Salatin also sets forth the example of a time when farm factories were feeding calves dead cows, cow blood, and chickens, suggesting the predicament of mad cow disease could have been avoided had we treated "herbivores like herbivores to mimic the natural cycle."

In our current situation, not once has there been mention of one crucial aspect that may make some sense of the urgency being placed on the approval of genetically engineered salmon. What is AquaBounty feeding this new form of a popular delicacy? When Mr. and Mrs. Fox, industrial chicken farmers in Rison, AR, were presented with the question of what the contents of their chickens food was, they admitted they were not entirely sure, stating there were a number of vitamins and nutrients. That seemed to be the extent of their knowledge. If one major corporation can omit full details of what our food is being fed what is to say the rest can't get away with the same?

Anyone can easily type the question "What do wild salmon eat?" into a search engine and find a large variety of sources offering the answer in full detail. For example, according to Whatcom Salmon Recovery, an informational website and cooperative extension of Washington State University, what a salmon eats relies on a variety of aspects, including "age, species and location." Specialists agree that adolescent salmon, still inhabiting fresh water, generally eat zooplankton and adult invertebrates, granted species type is still a factor. A typical juvenile salmon diet may contain a range of organisms including "mayflies, caddis flies, stoneflies, plankton, terrestrial insects and small crustaceans, and larvae and insects" (Whatcom Salmon Recovery). As a salmon emerges into adulthood, their diet may change; most species types grow to hunt smaller or larger adult fish, shrimp, herring, and so forth. It's as simple as that for a fish that is nearly guaranteed to be completely safe for consumption, taking sensitivities and

allergies into consideration.

Can the same be said for genetically modified salmon? Interestingly, when the same question is presented, with the simple addition of the words genetically modified, no results are offered, no suggestions are offered, not even a hint is offered in the way of an answer. AquaBounty provides no information by way of their website, not even a clue. Once approval is passed, what suggests we will have more information than is accessible at this crucial point? Could all this be a stepping stone to something far more terrifying? So many factors seem to tie into this matter. Monsanto, for example, being a patent holder of genetically modified corn, among having a former employee as a temporary voting member, and countless amounts invested in genetic modification, is there a possibility we will all be eating GM salmon that receives its nutrients from GM corn? This brings one seriously morphed meal to our dinner plates, because we are what we eat, right?

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