

THE ETHICS OF MODERN FOOD TECHNOLOGY

by

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I. INTRODUCTION

The study of the ethics of biotechnology is a specialized branch of the new science called **BIOETHICS**. Bioethics in turn is a branch of the science of **ETHICS**.

BIOTECHNOLOGY is defined as the application of biology for human ends. It is divided into Traditional Biotechnology and Modern Biotechnology.

Traditional biotechnology refers to common farming or agricultural activities like domestication of plants and animals, genetics selection and the use of microorganisms in the manufacture of cheese, bread, yogurt, wine and beer. It has long history. It has been practiced as early as 12,000 B.C.

Modern biotechnology is of more recent vintage. It dates back to only 20 years ago, when tissue culture, embryo transfer and genetic engineering became possible through the advances in science and technology.

We can cite at least two differences between traditional and modern biotechnology, namely:

1. Crossing one species with one another, in T.B. only closely related species can be crossed, in M.B. even unrelated species can.
2. The pace of change is very slow in T.B. in M.B. genetic material from one species can be permanently inserted into another in a matter of days.

Biotechnology can be practiced in plants, animals and humans. In this paper we limit ourselves primarily to plant for food or food biotech. If we touch on animal biotech it will be only in passing or very indirectly. Biotech on humans – like human *in vitro* fertilization, human cloning, embryonic stem cells therapy, human embryo experimentation and many others – is not covered by this paper.

II. FRAMEWORK FOR DISCUSSION

Any topical discussion, including the ethical dimension of the topic, must stay within an agreed framework.. If one were to argue from the standpoint of one extreme framework against the opposite extreme, the debate would never be resolved, the opposing positions would remain intractably polarized.

In the presently raging debate over Genetically Modified Organisms in Food Biotechnology, there are two extreme frameworks diametrically opposed to each other, which exacerbate the polarization.

One extreme position, for want of a better term, can be called **ANTIGLOBAL ENVIRONMENTALISM**. This position includes, if you will forgive the oversimplification, three major elements, namely:

1. a reactionary antagonism to the introduction of any foreign element into a local culture;
2. a neo Marxist economic theory that is dialectically opposed to multinational capitalistic corporations;
3. an exaggerated reverence for the environment as if we a sacred reality superior to man.

It is not difficult to sympathize with the position. It has a sad history behind it. In the not-too-remote past, local cultures in the third world have had traumatic experiences of exploitative manipulation and domination by our colonial masters. The introduction of any technology from the first world is always eyed with suspicion.

In the same vein the influence of Marxist propaganda in Third World cultures has had an adverse effect on our attitudes toward capitalistic multinationals.

Likewise the new awakening to ecological concerns has heightened to apothotic proportions the reverence for nature.

The opposite extreme position, again for lack of a better term, can be called **SCIENTISTIC UTILITARIANISM**.

This position includes likewise three major elements, namely:

1. A deification of science and technology as if they hold the ultimate answer to all human problems;
2. A utilitarian norm of morality where every human act is judged by its practical and material usefulness;
3. An utter lack of respect for nature as if can be used, overused, and abused as long as the material well-being of man is served.

The second extreme framework upholds the supremacy of science and technology over nature.

The two extreme positions have reached a point of intransigence. Anti-global environmentalism on one hand always looks at scientific utilitarianism with suspicion; all new technological intervention as an undue tampering with the sacredness of nature.

On the other hand scientific utilitarianism holds that every new technology is a sign of progress; all economic progress is equated with human development; and all commercial profit is good because it advances further technological progress, enhancing the material well-being of man and society.

These two extremes are like Rudyard Kipling's: "For east is east and west is west, and never the twain shall meet." We need a third alternative: one that is moderate and able to mediate between the two opposite extremes. That third alternative ethical framework is what I bring to this Seminar. Once again, for lack of a better term, this ethical framework can be **called CHRISTIAN ENVIRONMENTALISM**. The philosophy behind it is in conformity with the recent Papal Teaching *FIDES ET RATIO*. It follows the classical tradition set up by Aristotle and "Christianized" as it were by St. Thomas Aquinas.

The fundamental tenets of CHRISTIAN ENVIRONMENTALISM are:

1. All things are intrinsically ordered to the creator;
2. The human being constitutes the summit of material reality;
3. The human being exercises dominion over nature in order to glorify god, the creator.

(Gen.1: 26-29) “God said: ‘*Let us make man in our own image, in the likeness of ourselves, and let them be masters of the fish of the sea, the birds of heaven, the cattle, all the wild beasts and all the reptiles that crawl upon the earth....*’ God blessed them, saying to them, ‘*Be fruitful, multiply, fill the earth and conquer it. Be masters of the fish of the sea, the birds of heaven and all living animals in the earth.*’ God said, ‘*See, I give you all the seed-bearing plants that are upon the whole earth, and all the trees with seed-bearing fruit; this shall be your food.*’”

4. Ordering all things and directing them toward their end, which is the glory of god, is an act of stewardship.

(The Catechism of the Catholic Church n. 339 teaches: “*Each of the various creatures...reflects in its own way a ray of God’s infinite wisdom and goodness of every creator, to avoid any disordered use of things which would be in contempt of the Creator and would bring disastrous consequences for human beings and their environment.*”)

In sum **CHRISTIAN ENVIRONMENTALISM** advocates: **CUSTODY STEWARDSSHIP** and **RIGHT ORDERING**.

Custody, is the preservation of the integrity of nature, respect of its inherent nature because God-given “stability, truth and excellence” (*Gaudium et Spes*, n.36).

Stewardship is the responsible use of material things for the real good of the human being, the society and ultimately, the glory of God.

Right ordering is the establishment of reasonable criteria and guidelines for the exercise of stewardship in order to:

1. foster the dynamic harmony of nature and its sustainable development for the sake of future generations; (“Sustain the earth’s growing population by maintaining the viability of the biosphere.”);
2. effectively monitor new technologies and check them out for safety and benefits or harmfulness and risks;
3. attain the good of man and society without inflicting irreparable damage to the ecology;
4. keep science at the service of man, and not vice versa.

(Ideas borrowed from Father Robert A. Gahl, Professor of Philosophy, Pontifical University of the Holy Cross)

Now with these ethical criteria for a framework, let us see how GMO in Food Biotechnology can stand up to it.

III. ETHICAL ISSUES

1. **WORLD HUNGER**. These are some 800 million people all over the world who are suffering from hunger and malnutrition in varying degrees. In Ethiopia alone, the USAID recently noted that 14 million inhabitants face the imminent threat of hunger. In the Philippines about 10% of our people, or roughly 8 million are hungry and malnourished.

Society’s moral responsibility to feed these teeming millions is inexorable. There is no escaping it. Population control is not the solution. First, it is immoral. Second because, even if population control is successful, its effect

in alleviating hunger is not immediate. The actually present 800 million hungry people have to be fed now.

Food biotechnology offers a humane solution: it promises to:

- 1.1. Improve significantly crop yield (The experiment in Tigaon, Camarines Sur is an eye-opener. Through biotech, they have increased corn yield by 700%!)
- 1.2. Increase resistance to pests and diseases, thus eliminating or reducing the need for agrochemicals which are injurious to health. (The use of GMO in agriculture has caused chemical pesticide manufacturers the lost of millions of dollars.)
- 1.3. Provide herbicide resistance, thereby reducing herbicide use. (Genetic herbicides are directly injected into the plants.)
- 1.4. Improve the nutritional properties of food. Lack of vitamin A causes blindness. This can be remedied by injecting the right gene into rice (the so-called golden rice, enriched with *beta-carotene*) and other grain. Researchers are working on a gene to be inserted into apple that could vaccinate children against the childhood pneumonia virus.
- 1.5. Remove allergies and toxins contained in conventional foods. (Vegetable oils can now be loaded with therapeutic ingredients against cancer and heart disease.)
- 1.6. Improve food qualities, and especially lengthen shelf life of vegetables. (Genetically engineered tomatoes beat the time lag from farm to market, and retain their freshness longer.)

If GMO can deliver on these promises, as indicators show it does, it can help quite substantially solve the global problem of hunger and malnutrition. However, to keep within the bounds of our ethical framework, GMO must see

that no harm is inflicted on human life and health, and that life and environment are not exposed to high risks beyond reasonable limits.

To safeguard against such dangers and high risks, GMO manufacturers have set up self-imposed tests and screens more rigid than those required for traditional foods. For instance, Erick Sachs of MONSANTO (a leading developer of biotech products), says, “*transgenic products go through more testing than any of the other foods we eat. We screen for potential toxins and allergens. We monitor the level of nutrients, proteins and other components to see that the transgenic plants are substantially equivalent to traditional plants.*”

Against the fears that genetic engineering might release uncontrollable forces into our environment and thus disrupt ecological balance, we enjoy the necessary safety precaution through the effective control strictly enforced by such vigilant watchdogs as the U.S. Department of Agriculture (USDA), the Environmental Protection Agency (EPA), the Food and Drugs Administration (FDA), and their equivalent counterparts in other parts of the world.

It is a fact that chemical pesticides cause a lot of pollution in the environment. GMO on the contrary offers an environmentally friendly alternative to artificial pesticides, which tend to pollute surface and ground waters, and harm wildlife.

2. **GENETIC IMPERIALISM.** This is one of the fears of Anti-Global Environmentalism. The Third World has had a long history of Western colonization, exploitation and imperialism, which is the principal cause of their perennial state of poverty. GMO, they say, is just the latest of these forms of First World domination. In the past the object of colonization were the rich lands of indigenous peoples and their cheap labor. In recent times, it is their genetic material that developed countries are lusting for.

Ethics demands:

- 2.1. That a people's ownership of their genetic material be recognized;
- 2.2. That the use or exploitation of such material require their prior, informed consent;
- 2.3. That they be entitled to just compensation by way of royalties or some other dignified title; and
- 2.4. That it be considered a crime of theft and plunder to ride roughshod over their indigenous rights.

3. **PATENTING**. The right to patent is corollary to ownership. One has a right to protect his property, whether they are material or intellectual. But it is not an unlimited right. Patent law requires that there be an inventive element of human intervention upon the property to be patented. Anti-Global environmentalists claim that genes, or even their so-called "sequencing" cannot be considered as inventive. However, there are others who insist that these can be patented, at least for, say, twenty years, so that:

- 3.1. The patent holder can derive some monetary profits to assure the continuity of the experiment or project;
- 3.2. The inventor can reap a monetary reward for personal ingenuity and efforts;
- 3.3. These can be a realistic basis for the settlement of just compensation due the original owner of the genetic material.

4. **LABELING**. The clamor to have GMO products labeled as such sounds reasonable and legitimate. This is supposed to enable consumers to make informed and wise choices, which the exercise of responsible freedom requires. But some GMO promoters say that this is unnecessary, since GMO projects are

substantially equivalent to traditional foods. Besides, they add, it is a waste of time. Who reads the fine print, anyway? Furthermore, labeling would just add to production costs, which would defeat the purpose if the idea is to make GMO food available to the poor.

But anyway, there is nothing wrong with labeling. In fact, if in the end it is shown that GMO food is safer, more nutritious and healthier, then labeling would be to the advantage of GMO.

5. **TRANSFER OF TECHNOLOGY.** It is in the rich countries where most of the GMO experimentation and production are conducted. They have the information and know-how on GMO's. If they withhold all this information from the poorer countries, they could corner the market as if were, and reap all the profits. That indeed, would be selfish of them. And it would belie their claim that they promoting GMO's for the benefit of the underdeveloped countries. Global charity demands that the owners of genetic material be considered equal partners in its technological development.

Transfer of technology is an act of global charity among sister-nations in the international community. In the family of man, no one should be excluded from the table of the Father's love.

6. **Bt.** This is short for *Bacillus thuringiensis*. *Bt* is probably the most controversial issue in the GMO debate.

Corn as well as salmon are being engineered to contain a gene from a common soil bacterium known as *Bacillus thuringiensis* (*Bt*) which produces a natural insecticide. *Bt* genes code for toxins are harmless to humans, but lethal to certain insects including the European corn borer, which is an insect that bores into cornstalks and ears. "Corn borer caterpillars bite into the leaves,

stems, or kernels of a Bt corn plant, the toxin attacks their digestive tracts, and they die within a few days.” (*National Geographic*, May 2002)

But certain environmentalism scientists like Allison Snow, a plant ecologist at Ohio State University, “worry that genetically engineered crops are being developed too quickly and released on millions of acres of farmland before they’ve been adequately tested for they possible long-term ecological impact.”

While it is true that genetically engineered plants” offer an environmentally friendly alternative to pesticides”, and in particular “the use of *Bt* varieties has dramatically reduced the amount of pesticide applied to cotton crops...the effects of genetic engineering on pesticide use with more widely grown crops are less clear-cut.”

The environmentalist argument continues, “what might be the effect of these engineered plants on so-called non-target organisms...? Concerns that crops with built-in insecticides might damage wildlife were inflamed in 1999 by the report of study suggesting that *Bt* corn pollen harmed monarch butterfly caterpillars...(which) was a confirmation that genetically engineered crops were dangerous to wildlife.” (*Cornell University report*) The so-called “precautionary principle” is what is at work in this kind of attitude. (“We have no grounds for shutting out this stuff, but it gives us a queasy feeling, so we’ll shut it out anyway.”)

This report however was countered by subsequent studies that said” the chances of a caterpillar finding Bt pollen doses as high as those in the cornell study are negligible...Butterflies are safer in a *Bt* cornfield than they are in a conventional cornfield.” (Rick Hellmich, an entomologist with the Agricultural Research Service.) According to Francesco Sala, Professor of Plant

Biotechnology, School of Science, University of Milan, “environmentalists have taken up (the announcement that *Bt* corn kills the monarch butterfly) as a bastion in defense of biodiversity.... However, successive refutation of this effect by the scientific community.... (has shown that) the monarch butterfly has grown in number and lives better than before in *Bt* corn since insecticides are no longer used.”

The fear that GM foods might be injurious to health has no scientific grounding. As Francesco Sala explains,” the European Community (for one) has financed extensive research activity into the risks of GM plants. In the year 2001, after 15 years of investigation, at a cost of 70 million euros, and the involvement of 400 research groups (including the best scholars from universities and public organizations,) the Community made their results public in a vast volume that is now available to the public. The official conclusions, written by the Community’s Commissioner of Research, affirm ‘the investigation of GM plants... has not demonstrated any risk to public health or to the environment beyond that verified in traditional plants and food... In addition, the benefits that they can produce for human health and for the environment are becoming more and more evident.’ Public research in the United States has already reached analogous conclusions. Other nations such as China, India and South Africa had (earlier) taken a careful attitude. These countries, after years of research regarding the safety of GM plants, have recently decided to definitely enter into the productive phase. Through the cultivation of insect resistant Bt-cotton on a vast scale, China hopes to solve the problem of the poisoning of 1,200 citizens every year due to the improper use of insecticides.”

No matter how unfounded, concerned voices continue to be raised “to postpone granting of permission for use of the hybrid seeds until a comprehensive study on Bt-corn be made because it deals with something we

consume.” If we pursue this logic, we might as well declare a public moratorium on the eating of *lechon* because it contains high levels of bad cholesterol.

But to put the minds of the worries at rest and settle once and for all the question of the safety of GM foods, *Bt* corn in particular, I propose a top-level, open to the public, dialogue between Pro-GMO and Anti-GMO scientists – *bona fide* scientists with university credentials.

IV. CONCLUSION

The endless quest for perfection has always been man’s vocation and mission in this universe. Ever since he received the divine mandate at the dawn of history, to “*increase and multiply and subdue the earth*” (Gen.1:26-29), man has relentlessly cultivated his skills in order to continually upgrade his condition. From the Stone Age to the Industrial Revolution up to Modern Times, man’s life on this planet has been an open-ended success story after another in the changing of the face of the earth for the better.

Modern food biotechnology is just one among the many new scientific phenomena that have impacted human life in dramatic fashion. Food biotech parallels the impact made upon man and society by cybernetics, space discoveries and information technology.

GMO in food biotech has redefined agriculture for the sustenance of life. It offers tremendous promise to solve world hunger, improve health, and enhance quality of life. But at the button line we are faced with the ethical question: Is GMO bane or bone? It all defends on what or how one makes use of it.

For nothing in this world is totally bad. Even fire and water, two basic elements of life and its preservation, can cause death, destruction and large-scale devastation. Nothing in this world is risk-free. We have to live with risks, for such is the stuff of life. Not to take risks is to stagnate and stalemate the quest for perfection. But as being endowed with intellect and will, we have to discern under the light of reason and calculate the risks against the benefits. Careful management of the risks-benefit ratio is the order of the day.

Modern food biotech has far from reached the summit of perfection. At best it is still at the experimental stage. Whether it will fully deliver on its promise remains to be seen. It has enormous potentials. But there are risks that we have to address honestly. Name-calling is out of order in this debate. We have to listen to both sides. Let us not victimize the truth in the effort to win an argument.

The best advise I hear “to analyze carefully how, where and why we introduce genetically altered products, and to test them thoroughly and judge them wisely, so that we weigh their risks against their benefits”. (*Jennifer Ackerman, National Geographic, Vol. 201, No. 5, May 2002*)

Caution, then, is the name of the game. Let us proceed with caution. My late Archbishop used to tell his driver who tended to run to fast. “*Despacio y buena letra*”. Slowly, carefully. Slowly, but not overly slow, because time is of the essence. A long wait may be too late. Carefully, but with courage to take calculated risks. This is what life is all about. This is the price of victory and progress. No guts, no glory. The future belongs to those who dream dreams, and are willing to take the risk and pay the price to attain them.