Genetic Engineering ("Biotech"): Use of Science Gone Wrong

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The manipulation of gene fragments has been fraught with ethical and unknown risks since the tools for this technology were first "discovered." Such discovery came in the course of basic biochemical research investigations in the last 40 years, starting with the discovery of the structure of DNA and RNA, together with characterization of the command these genetic materials have over metabolic machinery in living cells.

These discoveries have been very useful to biochemical investigation and have great potential for further development of diagnostic and research tools. However such powerful and novel tools and technology should be accompanied by great caution when taken outside the research laboratory. Great care should be exercised both within the research community and in developing products for sale. Science has been derailed somewhere along the line in the evolution of genetic engineering because, 20 years ago, the future of this field looked so promisingly bright—perhaps too good to be true. Furthermore, *the underlying assumptions have not been tested.*

Lack of prudence in commercializing "genetic engineering" has been fueled by a colossal money grab on the part of industry and universities which, driven by a curtailment of public funding and seduced by a speculative "rainbow chase," have abandoned the traditional prohibition against commercial involvements in technologies.

In a very real way, universities are at risk, and some have committed misuse of funds in "gambling" on biotechnology as a direct investment. Since when do publicly-funded universities invest in speculative stocks? Since when do their research priorities get skewed by vested interests? Academic freedom is at risk here. Yet the university community sees it as just the opposite—that any restraint on full release of the technology is an affront to "academic freedom." *In vitro, in vivo* and *"in eco"* understanding of the mechanisms of molecular biology has not been achieved just because we can "crack" the code and manipulate gene fragments!

What we have then is an institutionally accelerated release of untested and untried products which jeopardize the environment, human health and the liability of the academic institutions which have become *promoters* of

questionable technology. The scientists and teachers involved have become arrogant, even if not economically self-serving, about our understanding of life processes.

This then, accelerates the rush toward reductionist, "silver bullet," curative (rather than preventative) approaches to health, environment and social problems. It has also truncated the comprehensive and diversified approach to biological research and development—the very basis for a "university" approach to this science.

More specific criticism of "biotech" products is rooted in the predominance of products tied to inappropriate solutions to agricultural problems—problems which are avoidable simply by changing farming practices. Biotechnological solutions are therefore directed, with huge expense and investment, at non-problems. Those producing these resulting products are generally completely oblivious to serious consideration of side effects or simple alternatives. Without holistic (cradle to grave and beyond) analysis of its products, this "biotech" industry is doomed to failure.

Here are a few examples of predominant categories of genetically engineered products for non-problems and the consequences:[1]

PRODUCT	CONSEQUENCE
Herbicide-tolerant plants	Enhanced and accelerated pollution of the environment, water, soil and food by herbicides. Accelerated development of resistance to herbicides by targeted weeds. Possible toxic characteristics of novel varieties to humans, livestock or wildlife.
Disease (decay)-resistant crops	Accelerated resistance development by disease organisms. Indigestibility of decay-resistant plants. Possible toxic characteristics of novel varieties to humans/livestock/wildlife.
Pest-resistant plants	Accelerated resistance development by pests; unbalancing of natural controls.
Food and drug substances differing "only slightly" from their natural counterparts.	These are especially novel compounds and the "priesthood" of genetic engineering should not be allowed to pretend that their variants are "safe" while nature's varieties are "suspect."

[1] The solutions to the "non-problem" have invariably resided in farm-plan and farm redesign, cooperating with nature, timing, biodiversity enhancement and restoring balances in production agriculture.

The tacit assumptions surrounding these products are that:

• there is only one effect of the product—that of "solving" the targeted problem;

• the problem has no other solution, i.e., the farming community cannot change from the chemical treadmill;

• nature has no limits and that, if it does, there are no consequences to violating these limits;

• genes control only one phenotypical trait and do not interact in expression;

• holistic ecological interactions are trivial; and/or

• there are no synergisms in nature.

None of these assumptions appears to be true, and there are few visible efforts to test the assumptions for fear of losing the foundations of the technology. This inevitably leads to bad science and misuse of science.

Even if genetic engineering does not lead to unforeseen mutations and runaway alien varieties, the disruptions to balances in nature are predictable—a genetic characteristic always results in an end product or products in the organism, substances which nature assimilates gradually over time. By natural selection, nature eliminates its mistakes. Without allowing for natural corrections, we are placing ourselves above nature, accelerating this assimilation process and rushing to market questionable products, recognizable as mistakes only after generations—a Faustian bargain at best.