Ten Points to Introduce Biotechnology

–From the Editor, August 1999

I. Biotechnology creates living things, not inanimate objects.

II. Transgenic biotechnology creates living things that would not be alive otherwise–salmon with human and chicken genes, tobacco with firefly genes, potatoes with pesticides– which launches an order of artifice that is distinctly different from the bits of paper, plastic, or aluminum cans we pick up as trash on the sides of roads and recycle. These new forms of life will interact as living things do, giving off pollen, swimming, flying, running, mating, multiplying, eating, being eaten, dying, and decomposing. These living inventions will be subject to the same systems of values and rights as all living things.

III. Biotechnology is the technology of an industry which–as is true of all industries–must be well-capitalized and correctly predict robust markets in order to grow. Today, the number and size of acquisitions, mergers, venture capital, and new upstarts of biotech companies go hand-in-hand with current and/or anticipated markets in: (1) genetic engineering for crops, livestock, fisheries, and forests; (2) genetic engineering for humans who are unborn, sick, maimed, physically or mentally nonconforming; (3) genetic information useful to numerous databanks, including those of national and domestic security forces, criminal forensics, institutions of education and employment, and medical, life, and disability insurance companies; (4) some predict human clones as perpetual organ/limb/skin factories, and imagine genetically engineered chimeras (part human, part primate) as a new labor class; and, (5) genetic engineering can be used for biowarfare and terrorism, by targeting populations of crops, livestock, and people.

IV. Biotechnology creates living inventions that affect ecosystems in ways that cannot be recalled like faulty brakes, cannot be cleaned up like an oil spill, and cannot be stored like radioactive waste. Genetically engineered live viruses meant for influenza immunizations or for cancer treatments can mutate beyond targeted host cells and create new, epidemic viruses. The escape of genetically engineered crops, livestock, fish, or trees into wild populations can irrevocably mix with wild species and homogenize its genetic pool, which may render any species vulnerable to single pathogens and affect its evolution. The collateral effects of biodiversity losses through "weediness" are incalculable–with impacts extending from microbes, soils, insects, birds, and plants, to oxygen levels, dew points, and weather patterns. Conversely, if attempts are successful in resurrecting extinct species, Jurassic Park-style, as with the Tasmanian tiger in Australia and the Huia bird in New Zealand, and each animal is subsequently introduced into zoos, parks, and wild ecosystems, then equally new and different ecosystemic impacts will occur. In all cases, the natural evolution of species and ecosystems is at stake as never before.

V. Biotechnology as an industry is neither self-cor-

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recting nor self-regulating, and has little precautionary regulation or oversight in place. Moratoriums and bans on genetically engineered organisms have been difficult to impose and harder to maintain. International trade law to date has refused to recognize genetically engineered foods as different from non-engineered foods, and has mandated patent systems in every country to accommodate and enforce ownership of genetically engineered organisms.

The United States is the world leader in genetically engineered organisms. The USDA is co-owner, with Delta Land & Pine/Monsanto, of the terminator technology, which disables seeds from germination and obliges farmers to buy new seed each year. Industry officials expect U.S. agricultural exports to be 90 per cent genetically engineered within a decade. In April 1999, President Clinton awarded four Monsanto scientists the National Medal of Technology for the birth of *agrotechnology* and for placing the U.S. at the forefront of a new science. Thus far, food labeling and safety testing have not been required for the highest yielding crops or livestock byproducts, which are commonly consumed in milk, cheese, ice-cream, eggs, meats, potatoes, tomatoes, corn, soya, fast-food burgers and french fries, corn and potato chips, and baby formulas and baby foods. Further, genetically engineered organisms are legally regarded as the intellectual property of their inventors through US patent law. Throughout the 17-20 year span of an awarded patent, inventors are ensured exclusive legal ownership for the commercial application of genetically engineered life forms.

VI. Public criticism of biotechnology is, in the United States, virtually nonexistent. Public acceptance or support for biotechnologies is convergent with cultural beliefs that technological innovations are progressive, inevitable, and the best means to economically compete in global markets. Additionally, the mediated world of a predominantly consumer/entertainment culture is convergent with the spectacular, limits-defying feats promised by biotech. Public ignorance of ecological, moral, and human social issues presented by biotechnology can be attributed to: (1) de facto censorship through corporate intimidation and lawsuits; (2) self-censorship of career journalists and corporate-owned media; (3) aggressive public media campaigns by biotech industries; (4) contractual ties between biotech industries and universities, which tend to foreclose contrary research and contrary voices; (5) a failure in education to emphasize cultural and ecological literacy (preschool through university); (6) weak engagement of spiritual consciousness or practice; and, 7) a politically disengaged public.

VII. Advocates tend to characterize biogenetic engineering as problem solving. Critics tend to redescribe both the problem and the solution. Biotech advocates have identified world hunger as one urgent problem for which genetic engineering is the best answer, and actively promote a "Second Green Revolution" to meet the needs of an estimated human population of 10-12 billion in the 21st century. Critics argue that feeding hungry people is a distribution not a supply problem, and, in any case, a problem best solved by small-scale, agricultural practices independent of genetically engineered seeds, monocultures, and factory-style livestock.

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Biotech advocates promise solutions to global health problems ranging from conditions as simple as diarrhea to complex medical conditions such as diabetes and cancer, while critics argue that the root causes of many medical conditions are industry-related environmental toxins and contaminated air, water, and food supplies, for which bioengineering solutions are merely palliative.

Beyond strict medical applications, however, there exists a strong cultural bias for the techno-eugenic elimination of human imperfections, inferiorities, aging, and even death through genetic engineering. One group, the Extropians, hopes to solve the problems of biological barriers to create postbiological, posthumans: "persons of unprecedented physical, intellectual, and psychological ability, self-programming and self-defining, potentially immortal, unlimited individuals." An Extropian conference at UCB, August 1999, featured such well-known scientists as Gregory Stock (UCLA), Cynthia Kenyon (UCSF), Calvin Harley (chief scientist at Geron), Eric Drexler, and Roy Wolford. Critics argue against ideas of biological imperfection and perfectibility as diminished

and diminishing views of humanity and life processes.

VIII. Biotech scientists, writers, and industry advocates frequently disregard criticism as ignorant, hysterical, or sentimental. Yet, a growing number of cellular and molecular biologists (see Stuart Newman and Richard Strohman) persuasively argue that the science behind genetic engineering is incomplete, as most human diseases and complex traits are not genetically determined but shaped by epigenetic and dynamic processes. According to Richard Strohman, "Most human diseases, and complex traits in all organisms, depend on non-genetic processes. They are shaped by environmentally sensitive regulatory networks of molecular agents that obey dynamic rules. These "epigenetic" networks are generally unappreciated, and their rules are little understood by modern biotechnology. To prematurely initiate largescale genetic engineering–whether of vast areas of cropland or of human beings–based on genetic knowledge but epigenetic ignorance is to practice incomplete science and to invite disasters of unknown proportion."

IX. Biotechnology industries are also extensions of information industries. As Bill Gates said, "This is the information age, and biological information is probably the most interesting information we are deciphering and trying to decide to change. It's all a question of how, not if." In Silicon Valley, the leading edge is not in building computers, but in telling computers what to do–the who's who of new money are software designers. Three young entrepreneurs, Krishnamurthy, Piturro, and Kissel, are currently working to create digital clones with "reality merge" functions that will enable people to translate their bodies into digital data to go shopping and have clothes fitted on-line, seek medical advice, or play interactive games. Such a view of information and of the body's information as linked to providing newer, more efficient and powerful "options" for the modern person feeds into the globalizing economy and electronic herd described by Thomas Friedman in *The Lexus and the Olive Tree*. Ideologically, biotechnology as an information technology ignores a natural world in which animate life is part of larger-than-self, nonarbitrary, non-socially constructed, non-virtual processes.

X. Biotechnology is, as USDA Secretary Dan Glickman said, "The Battle Royale" for the 21st century. Beyond its battle for markets and control, such a battle fundamentally exposes rapidly diverging worldviews between those often referred to as "globalists" (a.k.a. *homo economicus*) and those often referred to as "localists" (a.k.a. *homo eroticus*). Globalists tend to view the living world in economic terms while localists tend to view economics in terms of the living world. As biotechnology is powerfully convergent with a globalist worldview and stands to create entirely new terms and conditions for the living world, the burden of articulation and argument falls on localists. Such a debate is a world historical debate that forces to the surface heretofore taken-for-granted or dimly intuited meanings and understandings of the living world. Its kind and quality will depend on all the arts of civilization–from science, literature, philosophy, theology, history–and it will depend on a public demand for it.

This issue of *Wild Duck Review* is devoted to an introduction of biotechnology and to people speaking with localist knowledge and perspective across science, literature, theology, ecology, and activism. As you will note, David Loy and Catherine Keller refer to "a world of made and a world of born" in their essays– language borrowed from e.e. cummings' line, "A world of made, is not a world of born." I posed to each of them the following question: "Beyond critiquing biotechnology's radical objectification and commodification of life, how would you articulate the moral questions before us of human privilege, life processes, and creation? Are we at a crossroads of a world of born vs. a world of made?"

~ Casey Walker