

# Rachel's Environment & Health News

## #526 - Here We Go Again

December 25, 1996

I would like to be wrong about this. I hope I am. But it seems to me there's a pattern of perpetual trouble ahead. It's avoidable, but only with major effort.

It seems as if the entire "developed" world is depending on rapid industrial innovation to pull its chestnuts out of the fire. The people who run the permanent government (they're not elected) seem stuck on the idea that tremendous growth will be required to solve the problems of poverty, well-being, and pollution within the U.S. and throughout the world.[1] Even the Brundtland Commission --the prestigious group that coined the phrase "sustainable development" back in 1987 --argued that the world's total economic activity would have to increase 5-fold to 10-fold to lift all humans out of poverty.[2] The need for growth has become an axiom of modern industrial/economic/political life.

A corollary to this axiom says that rapid technical innovation is the way to achieve growth. Therefore "sustainable development" requires rapid growth, which in turn requires rapid technical innovation, according to the people who think of themselves as managing the planet.

Obviously, this view creates an imperative to deploy new technologies --an imperative that is particularly visible, these days, in the fields of genetic engineering and materials science. (Materials science is the systematic effort to create materials that nature never made, from which to construct next year's automobiles, airplanes, rockets, medical machinery, sky scrapers, foodstuffs, space stations, pesticides, communications and entertainment platforms, armaments and so on.)

It seems worth mentioning that, in the recent past, mad dashes toward new technologies have usually created serious trouble:

\*\* Our oil-based civilization seemed like it was giving us a wonderful life until it started warming the planet: in 1995-1996 the world's community of meteorologists reached consensus that our devotion to petroleum has ominous implications for the kind of world we will leave to our children.[3]

\*\* For 50 years, new uses of mercury proved to be very productive in scientific instruments, silent light switches, latex paints, pesticides, and more. But now we find that the mercury content of the world's atmosphere has nearly doubled and consequently the fish in most of our fresh waters have become poisonous from a build-up of toxic mercury in their tissues.[4]

\*\* Lead is a superb pesticide, gasoline additive, paint supplement, and glaze for pottery, but now we find that, millions --literally millions --of children in the U.S. and abroad are having their intellectual capacity permanently diminished by lead poisoning.[5,6]

\*\* The invention of DDT made it possible to control malaria-bearing mosquitoes without understanding anything about the life-cycle of the mosquitoes --so easy that we forgot how to employ knowledge of mosquito ecology to control malaria, relying instead on the heavy hand of DDT. [7] Now that the side-effects of DDT have become apparent --disrupting the hormones of wildlife and contaminating humans on a global scale -- DDT is being phased out and malaria (the number one killer, worldwide) is resurgent. Other infectious diseases are spreading as well, because of environmental dislocations caused by human technologies.[8]

\*\* Learning how to "fix" nitrogen from the atmosphere was a marvelous innovation, leading to artificial fertilizers, increased per-acre agricultural yields, and green lawns. But now "environmental disruption caused by a planetary overload of nitrogen is emerging as a new global concern"[9] --a triple threat, warming the Earth, contributing to the destruction of the ozone layer, and diminishing valuable biodiversity.

\*\* Nuclear energy was sold to taxpayers with the promise of electricity "too cheap to meter" and nuclear weapons so horrific that they would make war unthinkable. Nuclear electricity turned out to be expensive, and today war is hardly unthinkable. Furthermore, in late 1996, the U.S. Secretary of Energy declared, "The arms race is over. Our struggle now is to get rid of this sea of plutonium." The world's several-hundred-ton stockpile of plutonium (a substance described by its discoverer, Glenn Seaborg, as "fiendishly toxic") has created what the NEW YORK TIMES calls "one of the most intractable problems of the post-cold-war era." [10]

This list could readily be extended, but the point is probably clear.

Now, driven by the perceived need for rapid innovation to promote economic growth, we find that "We are in the midst of a second industrial revolution, one in which new high-tech materials are entering the workplace at an almost overwhelming rate," says Tai Chan, program manager of occupational health and safety research for General Motors.[11,pg.703] Of course, after they enter the workplace, high-tech materials enter commerce and eventually enter the general environment.

A recent article in ENVIRONMENTAL HEALTH PERSPECTIVES (a U.S. government scientific journal) says, "Seeking an elusive combination of high strength and light weight has driven engineers to develop a staggering variety of new fibers and particles." [11] And: "Unfortunately, many of the most desirable manmade fibers have many of the least desirable health-related characteristics." And: "Typically composed of various combinations of ceramics, polymers, and metals, these composites can pose a health risk to workers who inhale fibers and particulates, and may present health hazards as serious as those of asbestos." And: "In fact,... researchers don't have a good understanding of the mechanisms that may contribute to the toxicity of ultrafine materials." In other words, here we go again.

Carroll Pursell, a technology historian at Case Western Reserve University says, "Technology should be about the exercise of prudence. But economic considerations usually push new developments forward." [11,pg.703]

This is certainly the case with genetic engineering. The genetic engineering industry hit its stride in 1995-1996 when U.S. regulators (Food and Drug Administration, and Environmental Protection Agency) approved the commercialization of half a dozen new genetically engineered crop species, which are now being dispersed into the environment by farmers on a large scale. Soon these species will be sold abroad.

For the first 3 billion years of life on Earth, genes could only be shared among species that were similar enough to mate and reproduce. There was no way dog genes could get into cats, or corn genes into wheat. The gene pool of the mating species limited the genetic information that any species could contain. Natural genetic variations have always occurred, and those that promote survival may endure and eventually cause a species to evolve, but the process up until now has been glacially slow.

What's new about genetic engineering is that it allows genes to be shared among completely unrelated species. And QUICKLY. Genes from a trout can be put into a tomato, for example, to give the tomato some desirable characteristic that only the trout used to have. Species created in this way are called "transgenic species" or "living modified organisms" (LMOs).[12] Now, literally, for \$68 any microbiology graduate student can purchase a gene splicing kit and start transplanting tobacco genes into mosquitoes, or shark genes into lady bugs to see what will happen.

In 1996, the Union of Concerned Scientists (UCS) published a book urging caution as transgenic species are released into the environment. The book basically asks, "What will it mean to have a steady stream of animal and microbial genes entering the gene

pools of plants in wild ecosystems?" Based on principles of ecology (principles derived from observing the way nature works) UCS warns of the following scenarios: [13]

\*\* Gene flow, in which new genes from insect-, disease-, or herbicide-resistant species flow to wild plant relatives and weeds, causing agricultural and ecological havoc unless effective controls are available and affordable;

\*\* Harms to nontarget species arising, for example, from new gene products with toxic qualities being ingested by birds and other feeders in the regions where living modified organisms are cultivated;

\*\* Cascading effects on an ecosystem triggered by the introduction of living modified organisms, such as pests developing resistance to Bt in transgenic plants (see REHW #521) or being diverted to other food sources;

\*\* Loss of biological diversity arising when living modified organisms displace other species, a particularly acute problem in third-world nations that possess great crop diversity but lack the infrastructure and expertise to prevent losses.

Yes indeed, here we go again.

We must ask, why do we create such similar problems again and again? Why do we never seem to learn?

1) Most fundamentally because we believe we are the master species, and that the rest of creation exists for our benefit. We are free to do with it as we please. This completely wrong idea, this suicidal fantasy, is explored with wit and wisdom in Daniel Quinn's philosophical novel, *ISHMAEL* (Bantam, 1995). As Quinn sees it, either we will get rid of this deep-seated idea, or this idea will get rid of us.

2) Because we have set up our rules so that the people who perpetrate new technological mistakes profit from them in the short term, leaving the long-term costs to be born by others.

What could we do differently? We could put the burden of proof on those who want to deploy new technologies, similar to the way we put the burden of proof on people who want to sell new pharmaceutical drugs. An elegant, conservative scheme for shifting the burden of proof has been proposed by economist Robert Costanza. He calls it the "precautionary polluter pays principle." (See REHW #510.) Basically, it would require technical innovators to post a performance bond up front, to cover the worst-case costs of what they're about to unleash on the world. Would it slow the pace of technical innovation? Surely it would. Do we need such a slowing? Only if we desire a future for humans.

Happy New Year!

--Peter Montague (National Writers Union, UAW Local 1981/AFL-CIO)

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[1] The term "permanent government" was coined by Lewis H. Lapham, "Lights, Camera, Democracy!" *HARPER'S MAGAZINE* August 1996, pgs. 33-38.

[2] World Commission on Environment and Development ["The Brundtland Commission"], *OUR COMMON FUTURE*. Oxford: Oxford University Press, April 1987, pg. 213.

[3] Bette Hileman, "Climate Observations Substantiate Global Warming Models," *C&EN [CHEMICAL & ENGINEERING*

*NEWS]* Vol. 73, No. 48 (November 27, 1995), pgs. 18-23.

[4] F. Slemr and E. Langer, "Increase in global atmospheric concentrations of mercury inferred from measurements over the Atlantic Ocean," *NATURE* Vol. 355 (Jan. 30, 1992), pgs. 434-437. And: Thomas William Clarkson, "Human Health Risks From Methylmercury in Fish," *ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY* Vol. 9 (1990), pgs. 957-961. See also Janet Raloff, "Mercurial Risks From Acid's Reign," *SCIENCE NEWS* Vol. 139 (March 9, 1991), pgs. 152-156.

[5] See, for example, Robert A. Goyer, "Results of Lead Research: Prenatal Exposure and Neurological Consequences," *ENVIRONMENTAL HEALTH PERSPECTIVES* Vol. 104, No. 10 (October 1996), pgs. 1050-1054. Goyer describes major steps taken by American society to reduce lead exposure during the past 30 years, but concludes [pg. 1051], "In spite of the measures reducing lead exposure to date, large numbers of children in the United States have high exposure to lead and are at risk for impaired cognitive and behavioral development."

[6] See, for example, "Prevalence and Determinants of Lead Intoxication in Mexican Children of Low Socioeconomic Status," *ENVIRONMENTAL HEALTH PERSPECTIVES* Vol. 104, No. 11 (November 1996), pgs. 1208-1211. The lead problem in Mexico affects the middle class as well; see Paulina Farias and others, "Blood Lead Levels in Pregnant Women of High and Low Socioeconomic Status in Mexico City," *ENVIRONMENTAL HEALTH PERSPECTIVES* Vol. 104, No. 10 (October 1996), pgs. 1070-1074.

[7] John Wargo, *OUR CHILDREN'S TOXIC LEGACY* (New Haven, Conn.: Yale University Press, 1996), chapter 2.

[8] Ginger Pinholster, "The Specter of Infection," *ENVIRONMENTAL HEALTH PERSPECTIVES* Vol. 104, No. 7 (July 1996), pgs. 694-699. And see Laurie Garrett, *THE COMING PLAGUE; NEWLY EMERGING DISEASES IN A WORLD OUT OF BALANCE* (New York: Penguin Books, 1994).

[9] William K. Stevens, "Too Much of a Good Thing Makes Benign Nitrogen a Triple Threat," *NEW YORK TIMES* December 10, 1996, pgs. C1, C12, describing a report bearing "the imprimatur of the Ecological Society of America" to appear in the journal *ECOLOGICAL ISSUES* in January.

[10] Matthew L. Wald, "Agency To Pursue 2 Plans to Shrink Plutonium Supply," *NEW YORK TIMES* December 10, 1996, pg. 1.

[11] Scott Fields, "High-Tech Hazards," *ENVIRONMENTAL HEALTH PERSPECTIVES* Vol. 104, No. 7 (July 1996), pgs. 700-703.

[12] Michael Baram, "LMOs: Treasure Chest or Pandora's Box?" *ENVIRONMENTAL HEALTH PERSPECTIVES* Vol. 104, No. 7 (July 1996), pgs. 704-707.

[13] Jane Rissler and Margaret Mellon, *THE ECOLOGICAL RISKS OF ENGINEERED CROPS* (Cambridge, Mass.: The MIT Press, 1996).

Descriptor terms: growth; brundtland commission; sustainable development; petroleum; global warming; mercury; lead; DDT; nitrogen; nuclear power; materials science; genetic engineering; union of concerned scientists; ucs; ishmael; daniel quinn; jane rissler; margaret mellon; loss of species; occupational safety and health;