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America's religious conservatives aren't the only ones who object to science on spiritual grounds—so do Europe's Greens. The big winner is Asia

By **Lee M. Silver**
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April 5 issue - Many thousands of years ago, most of our ancestors were barely subsisting on whatever food nature provided for them in the form of wild plants and animals. Gradually, humans managed to turn the equation of survival in their favor. They did so by encouraging certain breeds or strains that had obvious advantages—bigger berries, more productive mammaries—over less promising varieties. It probably happened at first by accident, and later deliberately, by domestication. The result was to turn weeds into maize, wheat or rice; hairy goats into woolly sheep, and wild oxen into docile milk-producing factories called cows. These and other uses of what we now call genetic modification provided the foundation for every human civilization.

In the last decades of the 20th century, scientists developed techniques of directly altering life's biochemistry, making genetic and cell modification more efficient and predictable. One could argue that these techniques haven't fundamentally altered this age-old practice. But that's not the way many Europeans see it. After years of resisting GM foods, Europe is only this spring allowing them on store shelves with warning labels certain to scare off most consumers. As Europe debates whether to sanction the planting of GM crops on its soil, opponents warn of "contamination" and environmental apocalypse. There's no evidence that currently approved GM foods pose a threat to public health or the environment. So why is opposition so fervent?

For an answer, you need only look across the Atlantic Ocean. President George W. Bush is laissez-faire about GM foods. America's farmers produce them by the ton, and consumers eat them just as fast. Yet when it comes to other areas of biotechnology—anything that involves human embryos—the White House is every bit as fervently opposed as the Europeans are to GM foods. Europe and America, divided in so many ways, have come together in one sense: both stand against progress in biotechnology of one form or another.

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The parallels go further than many Europeans would care to believe. Europeans like to look down their noses at the religious fundamentalism that is part of Bush's character and political support, but in fact Europe's rejection of GM foods has an equally powerful spiritual component. To many Europeans, genetic engineering is an assault on God's sovereignty or Mother Nature's spirit. They fear a Frankenfood counterattack, just as the fictional Victor Frankenstein's attempt to create life brought forth a monster that ultimately destroyed its creator's world. This type of spiritualism may not hew to any organized religion, but it is based on the Christian linkage between body and soul and between organic substance and spirit.

There's nothing wrong with spiritual convictions. But they should be recognized as such, especially now that Western society is embarking on a course that is already having a detrimental effect on innovation in the biological sciences. In the very countries that spawned the original breakthroughs, innovation has either slowed or stopped completely, because of political resistance. If these were the only countries where such research could take place, biomedical advances would be set back significantly. Fortunately, the scientific world no longer revolves around Western countries. Scientists, money and ideas flow across borders; Asian countries that do not find biotechnology research contentious are the clear beneficiaries. Europe and America, though, could well lose their leadership roles in this important technology.

Stems cells are a case in point. Just six years ago the regenerative power of stem cells isolated from lab-grown embryos raised the possibility of a new generation of medical therapies for a broad range of human diseases including Parkinson's, diabetes and Alzheimer's. At the time, U.S. regulations prohibited the use of federal funds—about \$20 billion for biomedical research—in experiments involving human embryos. Scientists lobbied for a relaxation in these restrictions, while conservatives wanted to ban all embryo research, even with private funds. To appease his political base, Bush created the Council on Bioethics a month before the 9/11 attacks to advise him on "ethical issues related to advances in biomedical science and technology."

Two and a half years of contentious debate have shown that the council was weighted from the outset toward what mainstream bioethicists consider to be a conservative viewpoint. In February the White House apparently decided even that wasn't enough: it dismissed the two council members who had consistently spoken in favor of biomedical research and replaced them with three new members who had no experience in bioethics. When scientists and bioethicists complained, Leon Kass, the council chairman, fired back in *The Washington Post* that he was shocked by the "unfounded and false charges of political stacking of the Council."

He's not entirely wrong. In America the battle lines are being drawn between people with radically different *spiritual*, not just political, beliefs. All three new appointees are fundamentalist Christians. They join at least five other members of the council who have previously written of their conviction that early human embryos—microscopic clumps of cells—are gifts from God ensouled at conception.

Since Darwin, biologists have viewed all living things as variations on a common theme. Indeed, research shows that we human beings share nearly all of our genes with other mammals, and many genes with plants and micro-organisms as well. Yet American conservatives have no problem with the genetic modification of animals and plants because traditional Judeo-Christian doctrine holds that God gives souls only to human beings. Animals and plants are seen as soulless, purely biological entities, to be manipulated as we see fit.

Many left-leaning European intellectuals, in contrast, seem beholden to a different yet equally deep-seated sense of spirituality, one that encompasses all of Mother Nature. There is no other way to explain why so many on the left are so willing to reject all conceivable applications of genetic engineering. Granted, most currently available GM crops provide a benefit to farmers that is invisible to consumers. Granted, large U.S. or multinational corporations have patented much of the current technology (though patents expire after 20 years). And granted, many Europeans are fearful that the dominating influence of American culture could overwhelm the distinctive agriculture and cuisine unique to different European regions (a fear that I share).

But biotechnology, like all technologies, can be applied toward good or ill, profit or not. It has already reduced the use of pesticides and the tilling of farmland, a major cause of soil degradation. Cows have been engineered for resistance to mad-cow disease, and pigs have been made to produce fewer pollutants in their manure. Genetic engineering could make peanuts nonallergenic. And nonprofit organizations could carefully use the technology to increase the nutritional value of crops, add vaccines and reduce the ecological damage of traditional agriculture in underdeveloped countries.

Unfortunately, such nonprofit biotech applications are unlikely to be developed any time soon because the people most supportive of humanitarian efforts—the Europeans—are too busy condemning biotechnology as unnatural. In contrast, many of the same people have no problem with the unregulated production and sale of natural herbal remedies and dietary supplements, some of which (like ephedra) have killed hundreds of people. At least 200 million Americans have eaten GM food over the last decade without a single verified allergic reaction, without even a single GM-caused stomachache.

What is the true basis for the distinction between natural and unnatural? In condemning the application of biotechnology to plants and animals, Britain's Prince Charles said: "I happen to believe that this kind of genetic modification takes man-kind into realms that belong to God, and to God alone." Another spiritual objection, expressed in less explicit language, is enshrined in the Constitution of Switzerland. A 1992 referendum imposes a respect for "the integrity of living organisms" and "the dignity of living nature." A majority of Swiss people seem to believe that their valleys of well-tended meadows, neat farms and grazing cows represent a natural order that must be preserved. Of course, every component of this picture is the result of human intervention into a previous natural order that disappeared long ago.

In another example of left-leaning European spirituality, three Dutch bioethicists have condemned the potential use of bio-technology to create "quasi chickens—genetically engineered humps of living chicken flesh that do nothing but lay eggs." They condemn such technology not because it would cause pain or suffering to any animal, since the whole point is to eliminate the use and abuse of sentient creatures. Rather, they're upset because the creation of vege-tative pseudochickens will violate chicken integrity. What could possibly be violated when no animals are harmed or killed? It can only be the imagined spirit of the chicken species. This belief is ironic, because the domesticated chicken bears little resemblance to its wild ancestors.

The spiritual backlash against biotechnology in both America and Europe has pushed political leaders to pass laws greatly restricting R&D. Federally funded American scientists are allowed to work with only 15 or fewer old human-embryo stem-cell lines, all contaminated with mouse cells and unlikely to be very useful. Thousands of scientists have moved to Asia, where they can perform embryo research with few restrictions. These trends suggest that Asia will take the lead in clinical applications of stem-

cell research, at least in the short run.

Europe is suffering not only research restrictions but a decline in agricultural competitiveness. Partly because farmers use inefficient non-GM seed, they require ever-larger subsidies to stay afloat. Meanwhile, American farmers have latched onto GM crops as a way to cut down on pesticides, obtain better protection against adverse weather and increase yields. U.S. agricultural firms are luring skilled plant and animal scientists from Europe. For economic reasons, Europe will ultimately be forced to let down its gates to the GM revolution.

While Americans and Europeans wring their hands, Asians benefit from less-cumbersome spiritual beliefs. In Buddhist cultures, spirituality is associated with a sense of consciousness entirely detached from the physical world. Spirits can be imagined as fluid entities that merge and divide within and outside people, animals, plants and inanimate objects. Through this lens, individual embryos are not equated with —indivisible spirits, and biotechnologists don't have the power to interfere in the spiritual world, even if they want to.

Several Asian countries see a golden opportunity. The Chinese government has persuaded many Western-educated expatriate scientists to return to a homeland where research on human embryos is lavishly funded at dozens of laboratories. Separately, in 2003, a Chinese company became the first in the world to win approval for a commercial application of human gene therapy (for a cancer treatment). Government funding helped South Korean scientists to recently clone human embryos for the first time. Singapore is completing a \$288 million biotech complex called Biopolis, which will house 2,000 university, government and industry researchers. The country has attracted the British Nobel laureate Sydney Brenner, Alan Coleman, from the team that cloned Dolly the sheep, and a new research division of Johns Hopkins University Medical School.

As Asian nations take the lead, the advantages of allowing this research may become clearer to Western cultures. America and Europe may even change their views. If so, globalization would be the savior of both science and people.

Silver is professor of molecular biology and public affairs at Princeton University and author of "Remaking Eden."

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