

Trends That Will Affect Your Future . . .

HOMO SUPERIORUS

| by Stephan A. Schwartz |

The SchwartzReport tracks emerging trends that will affect the world, particularly the United States. For EXPLORE it focuses on matters of health in the broadest sense of that term, including medical issues, changes in the biosphere, technology, and policy considerations, all of which will shape our culture and our lives.

What could be more natural than wanting a healthy beautiful baby? Has there ever been a time in history when parents, even in the midst of disasters and despair, did not wish to be delivered of a healthy child? And who wouldn't want to have a son or daughter who was as smart as Einstein, as athletic as Michael Jordan, and as attractive as . . . well, name the person whose looks you find most appealing? What could be more natural?

But this deep-seated drive when linked to the onrushing train of genetic medicine is creating a trend that will shape—both literally and figuratively—the future of our species. You haven't heard of this? It is not surprising. The linkage and its implications have almost no place at the table of the public conversation. Here are just a few examples of what I mean:

Quietly in a laboratory in Vancouver, Robert Holt, head of sequencing for the University of British Columbia's Genome Science Centre, is working to create the first made to order life form—what is being called “synthetic life”—a microbe.¹ Dr. Holt is part of a project led by Craig Venter, former head of Celera Genomics, the private firm that mapped the human genome in 2000. Dr. Venter makes it clear that he and his team have no intention of stopping with microbes. Putting aside for

the moment the profound implications of creating a life form from scratch, I mention this principally because, as Dr. Venter says, “We're going from reading to writing the genetic code.”¹

While Holt and Venter are finding out how to write our genetic code, Drs. Elizabeth Fisher at the Institute of Neurology and Victor Tybulewicz at the National Institute for Medical Research in London have perfected a technique for successfully transplanting human chromosomes into mice. It is a breakthrough holding the promise of transforming medical research into the genetic causes of disease. The mice were genetically engineered to carry a copy of human chromosome 21, a string of about 250 genes. About one in a thousand people are born with an extra copy of this chromosome, which causes Down's syndrome. These genetic studies will help scientists also discern which genes are responsible for a wide range of medical conditions prevalent among people with Down's syndrome, including impaired brain development, Alzheimer's disease, heart defects, leukemia, and behavioral abnormalities.

Many have hailed the work, but critics question whether such research does not push the envelope of genetic manipulation too far, blurring the boundaries that define what it means to be biologically human. And this is but one in a wide range of research efforts.

During just the past two years, researchers have created pigs with human blood, fused rabbit eggs with human DNA, and injected human stem cells to make paralyzed mice walk. Quite apart from the implications this research holds for the human species, this intermingling contains another nightmare scenario that some geneticists and medical ethicists have begun to take seriously. What if, by adding hu-

man brain cells, a human mind somehow got trapped inside an animal brain? That the *Legend of NIMH* came to life.

The “idea that human neuronal cells might participate in ‘higher order’ brain functions in a nonhuman animal, however unlikely that may be, raises concerns that need to be considered,” a recent National Academies of Science report warned.

While it is generally considered “unlikely that grafting human stem cells into the brains of nonhuman primates would alter the animals' abilities in morally relevant ways,” the report committee “also felt strongly that the risk of doing so is real and too ethically important to ignore.” The researchers admit they don't actually know what truly separates humans from close relatives like the apes nor how to measure the cognitive changes that might occur in a nonhuman primate subjected to genetic alteration, let alone any other animal species.

Moving directly into the domain of humans, Dr. Keith Chang of the Penn State University College of Medicine in Hershey, part of a team searching for cancer genes in zebra fish, discovered that the pigment cells of the fish resembled those of light-skinned humans. It led the team to search for and identify the specific zebra fish gene involved. They then identified the human variant, a gene known as SLC24A5, and this line of research holds the promise of letting us select a child's skin color. Imagine the unconsidered consequences of that single genetic control.

More directly addressing disease, the US government has begun a project that will rival the original Human Genome effort in complexity—a project to unlock the genetic abnormalities that contribute to one of humanity's scourges. The project will spend \$100 million over three years

on a pilot phase, which will be called The Cancer Genome Atlas. The goal is new diagnostic tests, as well as genetic treatment for that complex of diseases we call cancer.

"This is a revolutionary project," Anna D. Barker, deputy director of the National Cancer Institute, said at a news briefing in Washington. "It's going to empower all cancer researchers with an entire new set of data to work with."²

Meanwhile, at the University of Newcastle upon Tyne, in the United Kingdom, scientists led by Professor Doug Turnbull and Mary Herbert, have been given permission to create human embryos that will have three genetic parents.³ The researchers are undertaking the research, they say, because they want to prevent inherited diseases caused by mutations in the mitochondria DNA. Mitochondria are inherited from the mother, and the team plans to replace defective mitochondria in eggs with working ones from donor eggs. By merging single-cell embryos with donated eggs they will produce humans with three parents—two mothers and a father. About one in 5,000 people carry such defects. Most produce only mild effects, but some defects can result in babies born or spontaneously aborted because of fatal brain, liver, or kidney flaws.

What makes the technique particularly significant is that it takes genetic engineering in the United Kingdom to a new level. At present, gene therapy that alters defective DNA can only be done when the changes produced do not pass on to succeeding generations—what is known as "germ-line" genetic engineering. The Newcastle research could result in children being born who would carry added genes that would be passed on to all subsequent generations, thus, breaking that barrier. In the future, we may look back on this as the moment when *homo superiorus* formally began.

What will be the effect on society when the most privileged segments of the culture are functionally free of cancer? When they have none of the hereditary diseases like heart disease, cystic fibrosis, or diabetes, which have haunted humanity, going back into the undiscovered past? What is the overall effect of one or more races being disease free, while other cultures and racial groups are unable to afford such advantages? We not only don't know the an-

swer to these questions, we're not quite sure which are the really important questions. It is worth thinking for a moment about how all this might happen because I do not think governments will drive this process.

On an individual level, taken one-by-one, a single family's choice would seem to be too insignificant to be a factor in the shaping of the grander concerns of history. But it is exactly a single family's choice multiplied a 1,000-fold that reshapes who and what we are as humans. And because this is not understood, policies are developed without considering the role of individual choice. As a result, it is the unintended consequences that so often predominate.

Just a little over 20 years ago, an eye blink in historical time, the Communist Chinese sought to address overpopulation through the now well-known policy of one child per family. At the time, the population of China was closing in on a billion (today it is a little over 1.3 billion souls). No one with decision power in the Chinese government apparently thought through the unintended consequences that might flow from a cultural predisposition favoring boys—who could carry on a family name, and provide support for aging parents—given a sonic technology that could specify gender prenatally. The technology, of course, became widespread almost as soon as the social policy decision was made, driven by the cultural bias for boys, and individual families acted upon it as soon as it was available. Now, two decades later, government census figures show that there are 119 boys born for every 100 girls. It may seem a small differential, yet demographers now calculate that, by 2020, about 40 million men will live out their lives as frustrated bachelors, unable to find a wife.⁴

The other unforeseen consequence is that the cultural predisposition to treat boys, particularly when they are the family's only child, like little princes has produced a range of unforeseen psychological effects, many problematic.

As the unintended consequences of the one child social policy have become more and more apparent, the government has scrambled to find a way to correct what it earlier set in motion. China has made a commitment to reverse its gender skew by 2010 by launching a scheme of social pro-

grams, including pensions to rural families with no sons and education efforts designed to teach peasants that "girls are as good as boys." Whether any of this will work is far from clear, and many think China will be living with the unintended consequences of its overly simplistic population control measures for generations. This is not of just abstract interest. The rest of us also have a horse in this race because China is coming on to the world stage as the next great superpower, just as spoiled only-child boys prepare to become its leaders, not just at the top but throughout the infrastructure of government and business.

China is not alone in creating a demographic skew as the result of individual parents exercising gender selection. In India, according to a study published in January in the *Lancet*, up to 10 million girls are missing over just the past 20 years as the result of parents aborting female fetuses.

The researchers reported further that if a first child has been a girl second children were far less likely to be girls, again as a result of gender choice. When they compared educated versus uneducated mothers, they discovered that the educated mothers were twice as likely to exercise gender selection in favor of boys as compared with the less educated women.⁵

The developments in China and India are worthy of the closest examination because they give us some clues about what is likely to happen as genetic medicine techniques, and treatments come on-line. Imagine a world in which parents from prenatal testing, or laboratory arranged conception, have had all inherited and chronic diseases edited out of their child's future. No more heart disease, resistance to cancer, no type 1 diabetes, no epilepsy, multiplesclerosis, or cysticfibrosis. All forms of genetic malfunction corrected—a child whose features, skin color, height, weight, intelligence, and emotional stability have all been tweaked for the optimal. It sounds like science fiction; indeed, it has been the stuff of science fiction for more than 50 years, but it is increasingly science fact.

Now imagine how much greater than China's single child policy will be the impact of such social engineering at the individual genetic level. It amounts to marketplace-driven eugenics. The term *eugenics*

(from the Greek *eugenes* or well-born) was coined in 1883 by Charles Darwin's cousin, Francis Galton, who applied the emerging Darwinian science in the development of theories concerning heredity and good birth.⁶ The idea of improving the human species became a subject of real debate and had a robust scholarly literature until World War II and the topic's embrace by the Nazis. Those policies, combined with research scandals involving institutionalized blacks in America, made eugenics a taboo word and subject. Perhaps that explains why the subject walks so lightly across our national consciousness. Also, eugenics is usually conceived as something a government does, like the Hitlerian fantasy of creating the new Aryan man. The central idea being government-directed programs. But what actually happens, as China (and a number of other nations) shows, is quite different; the driving force is individual choice in the marketplace.

And can there be any doubt that a mother and father capable of obtaining any of the advantages genetic medicine will offer will fight to get them for their child? Would your parents? Would you?

Perhaps you questioned my inclusion earlier of "emotional stability" on my list, wondering if genetics can address one's emotional life? Consider this, then:

At the Free University in Amsterdam and the University of Chicago, research teams have looked at data from 8,000 identical, and nonidentical, twins. One of their conclusions: genetics has a significant influence on loneliness, which has been linked to physically defined illnesses like heart disease, as well as emotional problems, such as anxiety, self-esteem, and sociability. "The genetic contribution to individual differences in loneliness is approximately 50%."⁷

Of course, all this that I am describing will only be taking place in the high-technology cultures in the West and East and, then, only among families that can afford it. So what happens? Over time, a growing number of these children, scions of affluence, will be born and, in the due course of things, will themselves become parents, passing on all the benefits they have received. Their numbers, beginning in the thousands, will quickly grow to hundreds of thousands and, eventually, millions as every family that can afford to do so avails themselves of what is on offer. It will become an issue of governmental policy. These individuals will effectively constitute a subspecies of humans. The usual demographic breakdowns of location and race will not obtain here. As one of the unintended consequences of US science being shaped by the Religious Right, the United States seems unlikely to dominate the age of biology as it did the age of electronics. Asians, Israelis, and Europeans are all represented in the intellectual arena driving the genetic science. America will not control breakthroughs as it did, and in many ways still does, in electronic information technologies. And as Asian millionaires, particularly, come into their own power, just as the genetic technology to achieve such aims becomes a reality, who cannot believe they will make use of it? Perhaps the novels of William Gibson are clairvoyant in this respect. What is convincing is that what authoritarian governments could not quite pull off, market forces seem poised to carry through.

Slowly, but with gathering speed, and without much public discussion, we are seeing the creation of a new subspecies of human: *homo superiorus*. What that means, we should start thinking about.

REFERENCES

1. Creating first synthetic life form. Available at <http://www.theglobeandmail.com/servlet/story/RTGAM.20051219.wxlife19/BNStory/specialScienceandHealth/>. Accessed December 22, 2005.
2. Pollack A. New genome project to focus on genetic links in cancers. Available at <http://select.nytimes.com/gst/abstract.html?res=FA071FF735550C778DDDB0994DD404482>. Accessed December 15, 2005.
3. Henderson M. Scientists win right to create human embryo with three genetic parents. Available at <http://www.timesonline.co.uk/article/0,,2-1772135,00.html>. Accessed September 10, 2005.
4. Available at http://today.reuters.com/news/newarticle.aspx?type=topNews&storyid=2005-12-26T040052Z_01_SIB614428_RTRUKOC_0_US-CHINA-GENDER.xml&rpc=22. Accessed December 26, 2005.
5. Jha P, Kumar R, Vasce P, Dhingra N, Thiruchelvam D, Moineddin R. Low male-to-female sex ratio of children born in India: national survey of 1.1 million households. *Lancet* 367:211-218.
6. Galton F. *Essays in Eugenics*. New York: Garland; 1985.
7. Boomsma DI, Willemsen G, Dolan CV, Hawtkley LC, Cacioppo JT. Genetic and environmental contributions to loneliness in adults: the Netherlands twin register study. *Behav Genet*. 2005;35:745-752.

Stephan A. Schwartz is the editor of the daily Web publication *The Schwartzreport* (<http://www.schwartzreport.net>), which concentrates on trends that will shape the future, an area of research he has been working in since the mid-1960s. For over 35 years, he has also been an active experimentalist doing research on the nature of consciousness, particularly remote viewing, healing, creativity, religious ecstasy, and meditation. He is the author of several books, numerous papers, technical reports, and general audience articles on these topics. He can be reached via e-mail at saschwartzschwartzreport.net.