

# Genetically Engineering the Human Species

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<http://author.senescence.info/thoughts/genetics.html>

Note: I don't totally agree with some of the things this guy says but I found the article somewhat interesting.

Genetic Engineering

"It's time to stop worshipping gods, and start aiming at becoming gods."

Markoff Chaney

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The Uncover of the Pyramid

Since Mendel's experiences and the discovery of the DNA as the genetic material, we started to know how and why we are like we are we; started to understand more about how our bodies work. Our genes are like the computer program running in us; we are what our genes code us to be.

The first big success for genetic engineer (GE) was the production of insulin by genetically modified bacteria. It showed the medical, economical, and industrial possibilities of this technology. Like a pyramid buried in the sands of the desert, the possibilities and uses of GE were being uncovered. Thanks to refined techniques in molecular genetics and recombinant DNA techniques, its uses soon started to be employed in a vast array of areas:

Medicine: in the diagnostic of diseases, understanding how diseases occur, and discovering how to fight them;

Pharmaceuticals: producing monoclonal antibodies, antibiotics, vaccines, interferon, and many other proteins with pharmaceutical value;

Agriculture: modifying both plants to become more resistant to pathogens and the environment — e.g. plant growth-promoting bacteria —, creating insecticides (toxic proteins and viruses);

The food industry: modifying food (sweetness, color, nutritional value — e.g. meat with less fat —, etc.), livestock (creating animals with higher reproduction rates, better quality, etc.), and even using microorganisms as food supplements;

Environmental applications: bioremediation by creating and optimizing bacteria capable of degrading xenobiotics;  
Industry: using microorganisms to produce all sorts of molecules and optimizing molecules by mutagenesis and computational models.  
At least until nanotechnology arrives, GE will be the ultimate biotool. GE will be at the base of the pyramid, the base that holds everything and is the largest of the blocks. And its applications are just starting to unfold.

### The 47th Chromosome

My lovely 46 chromosomes!

Perfection is something that doesn't exist in nature. You and me are no different. We suffer from painful and horrible diseases, we can die for the most trivial causes, we will inevitably die of aging, etc. Yet we can change all that. We can change the tyranny of the genes and become better than we are now. The possibilities are immense: genes that offer protection against diseases such as cancer and AIDS; enhanced senses and intelligence, anything we can imagine. For example, many animals have skills we do not possess but whose genes we might map and whose functions we might later incorporate into humans. In addition, as computers evolve, we will be able to design proteins in computers to suit one's individual needs. So, for instance, if you want to have stronger legs, you go to the doctor and he inserts a gene to give you stronger legs.

At present, technology to upgrade the genes is still in its infancy. It is very difficult to change a gene in an adult human. Hopefully, due to stem cells, tissue engineering, or gene therapy, that will change in a near future and we will be able to upgrade ourselves.

The 47th chromosome — also called techno-chromosome — is an addition to our current set of 46 chromosomes. This would allow us to include all the changes we desire without the danger of creating genetic imbalances by changing our current chromosomes. Studies in mice done by Chromos Molecular Systems were successful in engineering an artificial chromosome so that it can be passed into the progeny, so this is not science fiction.

Besides all the biological augmentation you can imagine, we can become a little bit more ambitious and desire for practically anything. Forecasting the future isn't easy but here's a brief description of some of the most ambitious ideas I've come across:

All sorts of improvements can be made to our metabolism. Besides the obvious life-extension procedures, we might be able to turn ourselves more physically resistant in all sorts of manners. Making our skin and bones harder, making us stronger, improving our stamina, super-intelligence, minimizing pain and overall optimizing our biochemistry.

Many times, we have a disease but don't know about it until it's too late. If we can make the body have some sort of reaction when, hypothetically, a few cancer cells are present, that would be a major breakthrough in medicine. The idea is to include certain enzymes that can be activated when oncogenes too are activated in cancer cells. They could produce a certain chemical compound that would turn the cells pink or the urine green. This, of course, can be applied to many other diseases.

An Israeli scientist, Ehud Shapiro, proposed the inclusion of tiny biological computers in cells to work as microscopic doctors. Now, advances in DNA computer technology have been amazing. The idea is that DNA processing machinery can use DNA as a basic Turing machine leading to a computer. The idea is programming it to perform certain functions: for example, detecting, signaling, and treating pathologies. To incorporate in the genome genes that can offer protection during cryopreservation for long space trips.

To include viruses that attack bacteria — called bacteriophages — so that they can be produced by the immune system to attack pathogens whenever necessary. Each phage would be specific for each bacterial strain or family and would be present in the blood at small concentrations when no infection was present.

One of the most ingenious ideas — of which I couldn't find an author — is to encrypt the genome. Encrypting the genome is changing the DNA sequence that codes for a certain amino acid — the blocks from which proteins are built. The result would be a complete resistance to virus because viral DNA would code for the wrong amino acids and therefore would be inert. Using phages and DNA encryption at the same time would pose some problems but there are ways to obviate them — creating the phages in the human cells with a DNA different than the DNA that will serve as template for the viral genetic code, etc.

### Becoming Post-Human

GE on germinal tissues is the ability to change one's genes in a way that his/her offspring will be affected. This can and must — with current knowledge — be done in the early stages of development. This technique is already used in all kinds of organisms but its use on humans is forbidden by US, UK, and most western countries' laws.

I'm against this prohibition for several reasons: firstly, some extreme cases of persons with severe genetic diseases or that are hosts for genetic diseases cannot correct such errors in their children. GE can overcome all this; all it would take was to correct the gene(s) that coded the disease. In addition, I defend my right to change my body as I please. I also defend that if I wish to have children with upgraded brains, I should be allowed to. Unlike theologians, bioethicists, politicians, and the like, I do not wish to impose my views on others, I just want to prevent others from imposing their views on me. Fortunately, attitudes are changing and recently the first

genetically–engineered babies were born, though the technique used involved changing a small amount of mitochondrial DNA. Still, it's nice to see such developments.

Genetic counseling techniques such as amniocentesis and pre–implantation genetic diagnosis are available and used to determine if foetus have these diseases and proceed with an abortion if the result is positive<sup>1</sup>. IMV selection of embryos is becoming ever more popular. But why stop at prevention? If we spend millions in trying to cure diseases like asthma, baldness, cancer, why shouldn't we cure these diseases before we are even born? Tay–Sachs syndrome, cystic fibrosis, Gaucher's disease, and many other life–threatening diseases are the terror of any parent<sup>2</sup>. Why not proceed to the cure?

Following this reasoning, I see no reason to stop someone from improving his/her children from an aesthetic point a view; for example, choosing the sex of the child is soon to become a reality. Of course that the image of pretty is very subjective, but I don't know with what right can someone stop me from giving my children blue eyes through an artificial process. And there are several aesthetic considerations that follow a general agreement. Completely abnormal characteristics — being incredibly short or tall, huge noses, acne scars, and many others — are generally considered ugly. Most persons would like not to have them. So why not eradicating them? Why allowing some people to keep having those traits?

Some people argue that these kind of treatments will reduce the human species to only a few types of individuals. I disagree, how many beautiful person do you know? There are millions of beautiful persons each of them with their own individuality. The combinations are endless. GE would only eliminate the ugly extremes but would not decrease human diversity. Of course it would be necessary to protect celebrities from having their genes cloned, for individuals have a right for their individuals set of genes.

Some argue that GE can aggravate social differences. Yet we all know the best way to make sure only the rich have access to a certain technology is by making it illegal.

As an evolution for our species, this kind of treatment is also welcome because we will be able to evolve in ways not possible by natural means. We are barely evolving naturally since medicine allows our less fit individuals to survive. In addition to eradicating bad genes and increasing the rate of good ones, we will reach the point where new genes — from other species and even artificial ones — will be used. Check out *Homo sapiens sapiens cyber* for more on this.

If it wasn't for Dr. Fleming's Penicillin, I would be naturally dead because I had pneumonia when I was a child. It went against nature and I'm happy for it. As I mention elsewhere, Nature made us to suffer and die; it's our duty to fight and overpower Nature as masters of our destiny.

Upgrading our genome is the future. Of course we need to be cautious, there are still many technical problems to solve. For example, GE on mice is only about 5% effective and sometimes produces deformed mutants; the idea of birth of mutant children surely is horrifying for us all.

But new techniques are being developed. As I mentioned, you can confirm the genes of the foetus; selection of viable clones while the egg is an unicellular organism can increase the viability of genetically engineered eggs. In another breakthrough, researchers have created the world's first genetically modified primate, a baby rhesus monkey. The pioneer of genetic-engineering for inherited disease based on single-point mutations in the early 1990's, Dr. French Anderson of the University of Southern California, is now proposing to perfect in utero and germ-line genetic interventions. In our constant and ever lasting search for perfection we must change the environment that surrounds us but we must also change ourselves. Of course politics and religions will be devastated because once they draw their power from the weaknesses of us all, the fewer weaknesses, the more power they'll lose.

Sources and Links

1 — "Designer baby" technology usually involves an in vitro conception. One of four cells is removed from the embryo and is analysed. The technology costs about \$15'000 but the price is likely to decrease as it becomes more popular. Already 9 per cent of pregnant women have prenatal genetic diagnosis.

2 — Paul Berg actually claims that all diseases are genetic and defies anyone to find a disease that isn't.

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Human Germline Engineering – Implications for Science and Society

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"Tiny green men might have been a better experiment."

Stephen Hawking

(paraphrasing from a "Universe in a Nutshell".