

Hannah Jarrell

Rebecca Faery

21.730

Essay III Revision II

December 6, 2007

The Genome: Have it Your Way

Most people are familiar with the Burger King slogan “BK: Have it your way.” “What most people do not know is that more than just Burger King is planning on letting people have it their way. In fact, the “have it your way” way has been around for a while, but only recently has it invaded probably one of the oldest actions of most species, passing on their genetic traits. Animals mate and pass on a mixture of each parent’s genetic traits to their offspring. This is how microevolution developed. The animals with certain traits that were conducive to their survival lived and reproduced, with their offspring retaining those traits. It is believed giraffes’ necks become so long through the mating of animals that were able to survive because they could reach leaves in tall trees. But now commercialism and science have asked for different animals than nature has provided.

Oryx and Crake is a futuristic novel by Margaret Atwood. The main character Jimmy is the child of scientists who work with Pigoons, pigs with human parts. The idea is to have spare parts for patients needing skin grafts, livers, and even parts of brains. The genetic alteration of animals in the novel eventually leads to Jimmy’s best friend, Crake, altering the human species. He removes “undesirable aspects” and adds traits he admires in other species into the creation of a new species, the “Crakers”. Under Crake’s

control is a team of scientists none of whom seem to blink an eye at what they are creating. Those who are aware of the project believe that the new species will be sold as designer babies for the wealthy. Genetic alteration is a way of life in Atwood's vision of the future. Will it become a way of life in our real future?

The altered version of any species of plant, insect, or animal is known as a Genetically Modified Organism (GMO). GMOs can come in many forms, from bacteria to fish to monkeys. For animals, most of these modifications now come from the inserting of a gene into the embryo of the species trying to be altered. In the novel Oryx and Crake these GMOs were also being created by bored scientists. Besides Pigoons, they had Rakunks and Snats which were created by splicing together the genes of two different species. Present-day technology is not creating fully mixed species, but it is creating species with genes from other species. And, just as a rat and a snake would never mate, a monkey and a jellyfish would never mix. It goes against nature. But lately it seems nature will be forgotten for the sake of "progress".

Testing pharmaceuticals and possible other ways of curing humans on animals has been happening for years in the science community. But though humans and animals are all members of the animal kingdom, serious differences exist in their genomes, making it hard to know if these treatments will work on the human population. The first genetically modified mammals were mice altered in 1976 (Ren, 29). Since then altering the genes of animals has reached new levels. From fish to mice to primates, the steps continue to move closer and closer to altering a human's genes. The question is, why?

Mice have been altered in many ways to suit research; these mice are known as Transgenic Mice. Examples include the OncoMouse and the Doogie Mice. The

OncoMouse, developed at Harvard University, was created with an activated oncogene. A normal oncogene is believed to be the mutated gene that causes cancer. These mice are thus created to be highly susceptible to cancer. Doogie Mice have an altered N-methyl D-aspartate (NMDA) receptor. This receptor is responsible for helping learning and memory. The modified version of it increases the ability of mice to learn and remember what they have been taught (“House Mouse, *Mus Musculus*”).

Another version of a genetically altered group of mice is the Knockout Mice. A Knockout Mouse, unlike transgenic mice, does not have an added gene; instead one or more of their genes are rendered useless. This is done by placing an inactive version of the exact same section of the gene sequence next to the original active version. The body then replaces the original section with duplication because it does not see the inactivity of the gene sequence. There are multiple reasons for doing this, the largest of which is to determine the purpose of that gene. Mice with and without the working gene are studied and compared for differences. One example is “Fat Mice”. These mice are classified as morbidly obese due to the change in one gene, Carboxypeptidase-E.

“Fat Mice” are just one type of many being created by this technology. The “Methuselah” mice are created to outlive their fellow mice. The “Frantic” mice are created to study anxiety disorders and to develop possible cures that fix the affected genes. “Strong Mice” have abnormally high levels of strength due to knocking out the Myostatin gene that limits muscle growth. Knockout mice offer scientists great advantages and hope for the cure of many diseases (“Knockout Mice”). For example, if Cystic Fibrosis was detected early enough, quite possibly the knockout method would alter the CTFR gene. But at the same time they show what humans may one day be

paying to have done so that they have extraordinary skills. Who wouldn't want to have a stronger baby or a smarter baby? Parents no longer want their kids to simply be healthy and happy. Unfortunately they want their kids to be the best. But not everyone can be the best. Money can already buy so much; will it soon buy the perfect kid before it is even conceived?

In 2000, ANDi was born, and alteration of genes took one step closer to humans. ANDi, the reversal of the acronym for inserted DNA, is a rhesus monkey that was born with a small amount of a GFP gene, found in jellyfish. Scientists at Oregon Regional Primate Research Center created ANDi by infecting an unfertilized egg with a virus. This virus, carrying the GFP gene, affected a chromosome in the egg a few hours before fertilization. This process was performed on over two hundred eggs. Roughly half those eggs failed to grow. The only baby born with the gene that survived was ANDi; two others carrying it were stillborn (Trivedi). For the scientists that created ANDi, this monkey holds the hope that one day they will be able to create primates, who are similar to humans in genetics and behavior, who can carry genetic diseases presently trying to be cured (Ren, 29).

One of the first genetically altered animals created for commercial purposes was the GloFish®, the natural occurring Zebra Fish with a fluorescent protein gene from different marine creatures such as jellyfish. These GloFish® are sold for aquarium use only, but that does not mean that they and their spliced jellyfish genes will not make it into nature. The company that created GloFish® runs a website with information about their product. Most of the website focuses on what you can buy and not on the ethics of creating the fish. GloFish® come in three bright colors, abnormal colors for the standard

Zebra Fish. But who wants normal when you can have a GloFish® in Starfire Red™ Zebra, Electric Green™ Zebra, and Sunburst Orange™ Zebra? According to their website, GloFish® were originally created for scientific purposes. The fish were supposed to maintain the appearance of the standard zebra fish unless the waters they lived in were polluted. The fluorescent glow was supposed to be a warning sign about what humans were doing to nature. The fish presently glow constantly, so the original purpose has not yet been reached. Or has it? (GloFish®)

Genetic diseases unfairly invade the lives of infants born around the world every day. Is it fair that their lives will be more limited than others or even cut short because of a microscopic error in their genes, something they had no control over? The research in bioengineering has the ability to give such children a chance at a more normal life. Infants may no longer die hooked up to hospital machines, and every child may one day have the chance to spend his or her first birthday outside hospital walls. But as Peter Parker, Spiderman, was once told, “With great power comes great responsibility.” The power to change lives for the better is being developed in labs across the country. The responsibility is to do no harm. To focus on cures rather than dollars is what scientists must do if humanity is to take a step forward without taking two back.

Works Cited

Atwood, Margaret. Oryx and Crake. New York: Anchor Books, 2003.

GloFish®. 2007. Yorktown Technologies, L.P. 10 Nov. 2007

<<http://www.glofish.com/about.asp>>

“House Mouse, Mus Musculus” 10 Nov. 2007. 10 Nov. 2007

<http://en.wikipedia.org/wiki/Mus_musculus>

“Knockout Mice.” National Human Genome Research Institute. 24 Oct. 2007. 10 Nov.

2007 <<http://www.genome.gov/12514551>>

Ren, Yin. “Designer Babies: The Pros and Cons of Genetic Engineering.” MIT

Undergraduate Research Journal. Volume 12 Spring 2005. Massachusetts

Institute of Technology. 9 Nov. 2007 <[http://web.mit.edu/murj/www/v12/v12-](http://web.mit.edu/murj/www/v12/v12-Features/v12-f4.pdf)

[Features/v12-f4.pdf](http://web.mit.edu/murj/www/v12/v12-Features/v12-f4.pdf)>

Trivedi, Bijal P. “Introducing ANDi, the First Genetically Modified Monkey.” Genome

News Network 16 Jan. 2001. 10 Nov. 2007.

<http://www.genomenewsnetwork.org/articles/01_01/ANDi.shtml>