



Design-Your-Own-Baby

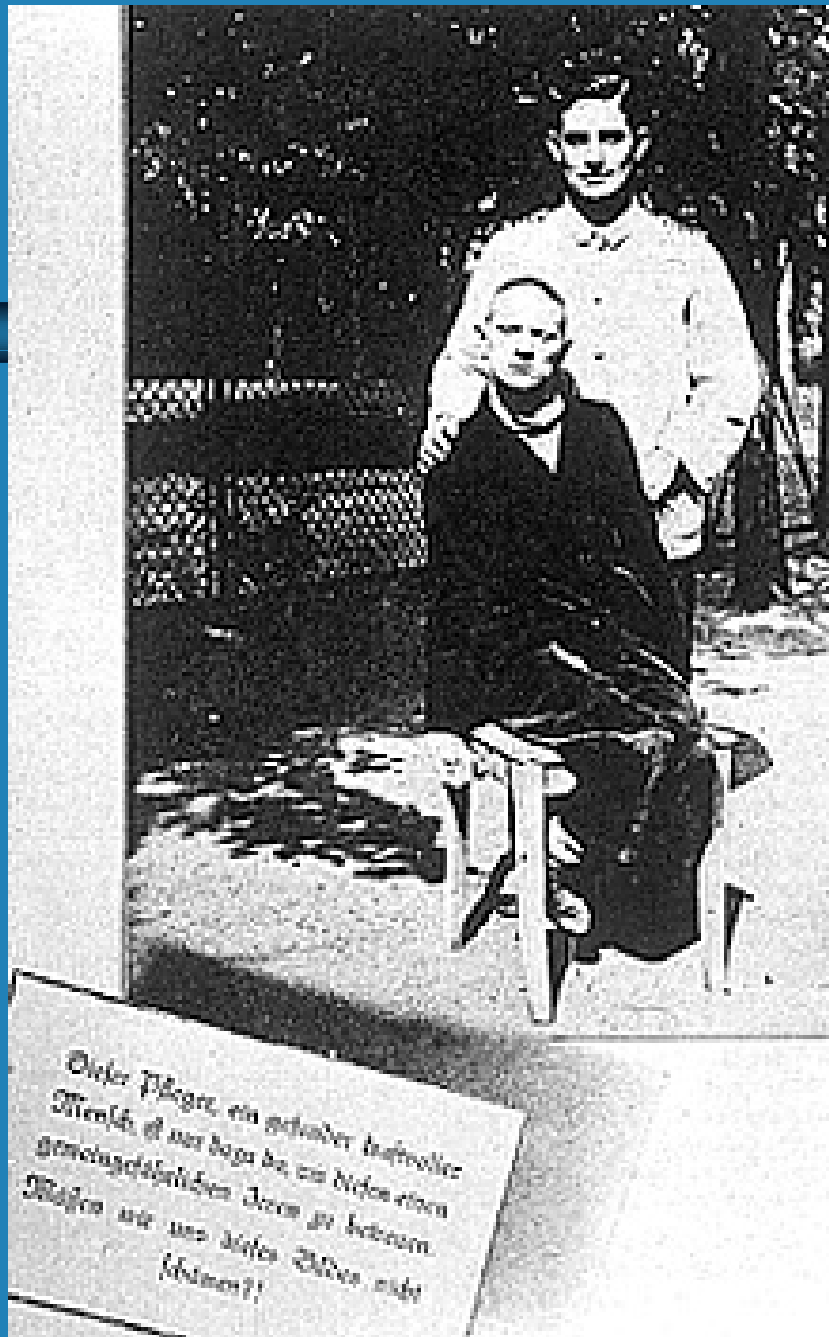
**The Techniques, Feasibility,
and Ethics of Human Genetic
Enhancement**

Eugenics: A Historical Perspective

- "Eugenics is the study of the agencies under social control that may improve or impair the racial qualities of future generations; either physically or mentally."

-Sir Francis Galton, 1904

- 20th Century America
- Nazi Germany



Nazi poster bearing the phrase, translated from German,

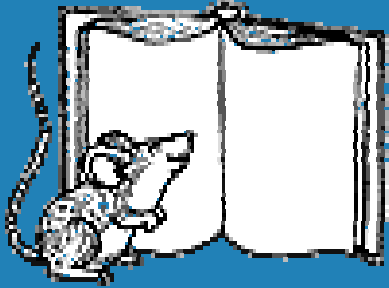
"A strong and healthy nurse is there only to give care to a dangerous madman. Shouldn't we be ashamed?"

A New Kind of Eugenics

- **The Human Genome Project**
 - Published Initial Working Draft Sequence (2001)**
 - Expected Completion: 2003-2006**
 - When the purposes of all of the expressed genes are identified, genetic manipulation of traits like eye color, intelligence, and height will be possible.**
- **Recent developments in IVF, pre-implantation DNA analysis, and improved techniques for gene transfer, insertion, and conversion**

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Transgenics

Basic Technique

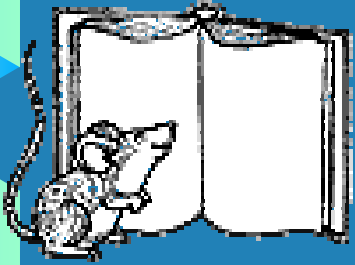
1. Identify gene of interest

2. Synthesize gene

-to make it tissue-specific, select or create a well-characterized promoter that will bind to homologous sequence in DNA to be spliced out

-Clone transgene fragment using PCR

Purify transgene



Transgenics

Basic Technique

- 3. Isolate large numbers of fertilized eggs from superovulated females.**
- 4. Using a micro-injection needle, inject transgene DNA into pronucleus of each single-cell fertilized egg.**
- 5. Re-implant eggs into oviducts of anaesthetized pseudopregnant females**
- 6. After birth, progeny tested for incorporation of transgene by PCR or Southern Blot.**

Problems with Current Techniques

- **Only a fraction of the animals derived from microinjected embryos carry the transgene**
- **While some transgenic animals do not have developmental problems, they often have high rates of tumor incidence during adult life.**
- **Some kinds of manipulation unsuccessful**
 - growth hormones in pigs**
 - increase muscle mass in cattle**

Genetic Treatment vs. Genetics Enhancement

- **Treatment: Fixing a genetic defect (i.e. trisomy 21, myopia)**
- **Enhancement: Genetic manipulation becomes enhancement when alteration is for “improving a characteristic that . . . Would be within what is regarded as a ‘normal’ range, or as installing a characteristic that would not normally be present.”**

Design-A-Child

**Your child deserves the best possible start. We have enough imperfection built in already.
You don't want to give your child any additional burdens.**

Sex

- Male
- Female

Eye Color

- Blue
- Brown
- Green
- Hazel

Height

- 5' +
- 5'5" +
- 6' +

Hair Color

- Red
- Brown
- Black
- Blond

IQ

- 100-150
- 150+

Disposition (check all that apply)

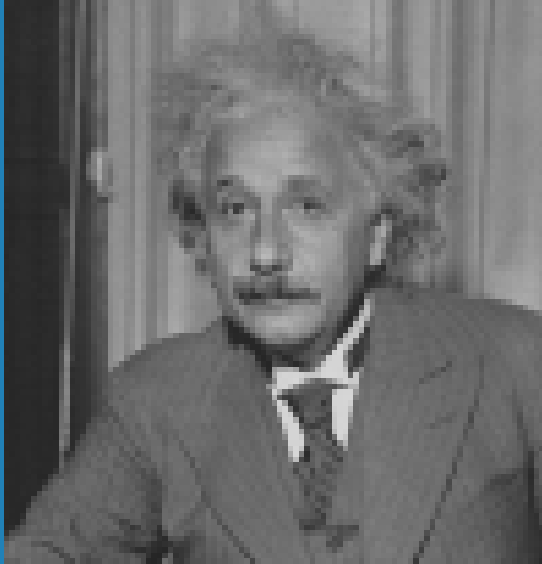
- Good-natured
- Talkative
- Aggressive
- Passive
- Charming
- Happy

Sexual Orientation

- Heterosexual
- Homosexual
- Bisexual

***Note: Our basic service provides genetic defect corrections**

Athletes, Supermodels, and Einsteins







What Do We Have Against Genetic Enhancement?

- **Ethical Issues**
- **Legal Issues**
- **Genetic Diversity Issues**



Ethical Issues

- **Link to the dreaded word “eugenics”**
- **Will widen gap between rich and poor**
- **Psychological welfare of genetically-engineered children**
- **Sacredness of genes**



Legal Issues

- **19 countries have already banned human cloning and genetic manipulations**
- **U.S. Constitutional Issues**
 - 1. Physical Freedom**
 - 2. Self-determination**
 - 3. Parent's right to make decisions on behalf of their children**
 - 4. Personal Privacy**
 - 5. Rights to Procreation**

Genetic Diversity Issues

- **Genetically-Enhanced individuals will be more fit to survive**
- **Homogenization of Society?**
- **Counterarguments:**
 - Although genetically enhanced individuals might have some physical advantages, there is no certainty that they would have greater reproductive fitness.
 - Neither gene transfer nor any of the other emerging reproductive technologies will ever have a significant impact on human evolution.

Why Genetic Enhancement Won't Hurt Diversity

- **Babies born every month worldwide:**

11,000,000

- **Assuming “enhanced” individual had his/her first child at age 20, the number of unengineered children born during the lifetime of enhanced individual before reproducing:**

2,640,000,000

- **Assuming 1000 successful “enhanced” babies created per year, % population they constitute:**

1/132,000



Future of Genetic Enhancements?

I AM THE SINGLE MOST
IMPORTANT CONSIDERATION
IN ANY HEALTH CARE
DECISION !!

PATIENT
BILL OF
RIGHTS

IS YOUR NAME
"PROFIT" ?

HMO





Future of Genetic Enhancements?

- Testing on humans will be difficult initially due to limitations on embryonic stem cell and human cloning research**
- However, when treatment for genetic disorders will be approved, it will open doors for other types of “therapy”**
- The first genetic enhancements that come before the FDA will be cloaked in therapeutic guises**
- Acceptance will come slowly**

Would You Enhance Your Babies?

