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Biological Determinism and the Human Genome Project: Is the Past Prologue?

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Abstract

In 1989, The National Institutes of Health, in collaboration with the United States Department of Energy, launched a three billion dollar project that could potentially change the way we view human life. The purpose of the project is to map every gene on every chromosome of the human DNA. The Human Genome Project, as it is referred to, is scheduled for completion by the year 2005. The frank reality of the Human Genome Project is that it will indeed offer some real and measurable benefit to different types of people, including some of those inflicted with fatal diseases and disorders; however, its social policy implications are even greater. Its potential effect on society as a whole and on the way we view human behavior is unpredictable.

The Human Genome Project seeks to understand human life at a molecular level by determining the function of each of the genes in the human genome, how they contribute to the vast array of human characteristics, and about the role they play in disease, development and behavior.

The project incorporates, and is a product of, the development of genetics since the turn of the century, and its social implications are strongly colored by the uses of genetics in the past. It could be argued that genetics is a science of human differences and much of the fear surrounding the project stems from exaggerations of the extent to which human behavior is genetic. Inquiry into behaviors such as criminality, intelligence, aggressiveness and homosexuality have been and continue to be the source of heated debate within and outside the scientific community.

It could be argued that the Human Genome Project is a more scientifically advanced form of biological determinism that lends scientific legitimacy to the belief that human behavior is inherited through the genes. The danger in this belief is that it reduces human life, and what it means to be human, to a mere biological function.

The information produced by the Human Genome Project will be vast and the potential for abuse even greater. The broad cultural appeal of genetic concepts needs to be kept in mind if we are to understand the social power of genetic information. Although the Human Genome Project is a medical miracle to the study of genetic disease, it is important that we exercise due caution in interpreting its results.

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Introduction

The accumulation of genetic knowledge alone-however precious in it's own right-does not guarantee wisdom in our decisions regarding human heredity; if such knowledge breeds a false sense of human mastery over genes, it can even lead to folly.
-David Suzuki

The Human Genome[1] Project, directed by both the National Institutes of Health and the U.S. Department of Energy, is probably the most politically delicate and, arguably, the most important government science program since the Manhattan Project. The objective of the Human Genome Project, which began in the late 1980's and is scheduled for completion by the year 2005, is to learn the entire nucleotide sequence[2] of human DNA. It has been argued by James Watson, former head of the project, and other project enthusiasts that the human genome is the key to what makes us human, what defines our possibilities and limits as members of the species *Homo sapiens*.

> The substance and versatility of the human genome lie in its details, in specific information about all the genes we possess, about how they contribute to the vast array of human

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[1] The term "genome" refers to the entire complement of genetic material in the set of chromosomes of a particular organism.

[2] Nucleotides are the basic building blocks of nucleic acids. The nucleotides or "bases" found in human DNA are adenine, thymine, guanine, and cytosine. Pairs of nucleotides, commonly called "base pairs", (A & T or G & C), run along either side of a DNA molecule and are hydrogen bonded together. A nucleotide sequence is the order in which these base pairs are found on the DNA molecule. A sequence map of the entire human genome will include the entire 46 chromosome, 3 billion letter text.

> characteristics, and about the role they play (or do not play) in disease, development and behavior. [3]

The knowledge gained from the project will undoubtedly revolutionize the understanding of human development, including the development of both normal characteristics, such as organ function and abnormal development, such as disease.

The project incorporates, and is a product of, the development of genetics since the turn of the century, and perceptions of its social implications are strongly colored by the social uses of genetics in the past. There are connotations of power and fear associated with the Human Genome Project. There can be no disputing the fact that the subject of genetics elicits a great deal of concern and worry. Human genetics has a problematic history, and sadly, ethnic, racial and religious minorities, and the poor have not fared well in this sordid history. Genetics, race and ethnicity have sometimes proven to be an explosive and even fatal mixture. Human genetics was the "scientific" foundation for the racism that was a pivotal factor in legitimizing Nazism and the Holocaust in this century. The link between genetics and social policy was not confined to Germany. According to Proctor, for much of the first half of this century in the United States,

> The mentally ill, the retarded, alcoholics, recent immigrants and those thought to be sexually promiscuous, especially if they were members of minority groups and poor, became the

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[3] Daniel J. Kevles, "Eugenics and the Human Genome Project: Is the Past Prologue?", Justice and the Human Genome Project, eds., Timothy F. Murphy and Marc A. Lappe, (Berkeley: University of California Press, 1994), vii.

> object of government sponsored sterilization efforts aimed at preventing the spread of 'bad' genes to future generations.[4]

It could be argued that restrictive immigration laws, forced sterilization, and prohibitions on interracial marriage were, in part, a legacy of mixing genetics, race and class in the United States and in many other countries as well.

Inquiry into behaviors such as criminality, intelligence, aggressiveness and homosexuality, and their prevalence in various ethnic or racial groups have been and continue to be the source of heated debate within and outside the scientific community. While inquiry into these subjects may be important, the results of this inquiry must be handled with great caution. As Kumar states,

> . . . many women continue to this day to have abortions upon learning that the fetus they are carrying is 47, XYY [5],condition that some geneticists maintained more than a decade ago was causally responsible for criminal conduct. While evidence for the 'criminal chromosome' has proven weak, the consequences for procreative decisions have proven to be very resilient.[6]

This is an excellent example of what may happen when human behavior is attributed to genes.

The mixture of racism, prejudice and genetics has proven so toxic that a strong case could be made that applying knowledge from

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[4] Robert N. Proctor. "Genomics and Eugenics: How Fair is the Comparison?", Gene Mapping: Using Law and Ethics as Guides, eds., George J. Annas and Sherman Elias, (New York: Oxford University Press, 1992), 186.

[5] The XYY characteristic, or karyotype, is a chromosome abnormality in which a man has 47 as compared to the normal 46 chromosomes. It is the result of a non-disjunction, or the failure of the chromosomes to properly separate during the meiotic division which gives rise to the sperm. In the mid 1960's this extra Y chromosome began being associated with tall stature, mental retardation and aggressive behavior.

[6] D.Kumar. "Should One be Free to Choose the Sex of One's Child?", Journal of Applied Psychology, 2 (1985): 201.

the realm of human genetics to public policy has led to far more misery, confusion and suffering in the twentieth century than it has to human betterment. History suggests that there are real reasons for concern about the impact a rapid increase in knowledge about human heredity might have on current and future social policy.

Thesis Statement

The Human Genome Project is a more technologically advanced form of biological determinism that lends scientific legitimacy to the belief that human behavior, criminal behavior in particular, is inherited through the genes. More importantly, the community of scholars, as well as the government, must insure that the genetic information produced from the Human Genome Project is not misused.

Methods and Justifications

The social and ethical implications of human genetics, which are being intensified by the Human Genome Project, are best analyzed when they are tied to the historical uses of genetic information. Much of the danger surrounding the project stems from exaggerations of the extent to which human behavior is genetic. There is much historical precedent for these concerns.

To illustrate some of the possible problems with using biological determinism and human genetic information to explain behavior, it is necessary to critically examine earlier attempts at utilizing a biological determinist model. A content analysis of some widely cited biological determinists will be conducted in order to illustrate the intellectual linkages between earlier models and the Human Genome Project.

The study of genetics is a more scientifically advanced form of biological determinism, and the information produced about our chromosomal make-up will enable scientists to understand us at a molecular level. However, there is a danger in the "illusion of control" that will flow from people assuming that everything, including our behavior, is genetic, without taking into account other factors such as the social environment. It may be that we are in the midst of an upsurge in biological determinism more insidious than the others because it lends scientific legitimacy to a once dismissed idea.

In Chapter One, a historical analysis of the theories behind biological determinism will be used in order to understand how the Human Genome Project fits into the ideas of biological determinism. The idea of biological determinism as manifested in the arguments of Cesare Lombroso, Earnest Hooten, William Sheldon and Sheldon and Eleanor Glueck will be examined. Their theories will be explored in an effort to illustrate the parallels between biological determinism and the Human Genome Project. Not only is it important to explore the ties between earlier arguments and the Human Genome Project, but also to get a better understanding of the consequences that could result when behavior is treated as biological reductionism.

Chapter Two of this thesis will explore the history of the eugenics movement. A new eugenics movement may occur as a result of the Human Genome Project. Americans, as Ian Taylor, George Annas and others have illustrated, have a love of science and believe it objective, provable and ultimately able to solve social problems. The scientific community is already unleashing a torrent

of new information about what makes us human. An unfortunate consequence of this information is a growing belief among some in genetic predestination in which we are essentially slaves to our genes. This predestination can be linked to born sinners and saints with genes, not God, being the determining factor.

The Human Genome Project aims to identify the function of each gene and its position on a "normal", disease-free, set of chromosomes. This will enable scientists to identify disease carriers by comparing them to the normal genome. This opens up a new world to eugenic practices, both positive and negative, because the more we know about our genetic make-up, the more we can abuse the information. Biological and genetic science may attain what it has desired for decades: a technique for social engineering.

Chapter Three will explore an earlier attempt to correlate anti-social behavior with genes: the XYY controversy. This was the attempt in which new genetic information spawned heated debates over what an extra Y chromosome may contribute to aggressive behavior in men. Despite the fact that no causal link was ever fully established between the extra Y chromosome and aggression, some still believed that there was cause for concern.

Chapter Four will explore the social and policy implications. The consequences of advances in analyzing the human genome may include preventive detention for those found to have a "criminal gene", state intervention in the lives of those with a "criminal gene" or even denying life to those who fall short of some optimum genetic fitness. More perilous still is the notion that behavior has a genetic component which makes us less responsible for our actions. Will the

time come when an abnormal nucleotide sequence is a sufficient defense against murder? Furthermore, the danger of believing in genetic predestination is that it may encourage the belief that drug abuse, theft and other such deviant or damaging behavior can be fixed genetically and that social causes need not be addressed. Furthermore, a complete gene sequence could result in losing or being refused employment, insurance or medical care to those with "defective" genes.

Fortunately, a percentage of the Human Genome Project's funds goes toward a sister project called ELSI, which is dedicated to studying the ethical, legal and social implications of the Human Genome Project. The Human Genome Project was initiated to support and coordinate the efforts of the National Institutes of Health and the Department of Energy to produce genetic linkage and physical maps of the human chromosomes and to sequence human DNA. ELSI was charged with anticipating the social consequences of the acquisition of this knowledge and developing policies to guide its use. As part of their contribution to this joint effort to encourage research and education on the ethical, legal and social implications of human genetics research, the NIH and DOE devote, respectively, 5% and 3% of their genome budgets to ELSI program activities. Likewise, the international Human Genome Organization, made up of scientists from around the world, has formed its own ethics committee.

The ultimate goal of the Human Genome Project, as stated before, is to identify and sequence the entire human genetic code. Its immediate and practical objective, however, is to identify the

genes linked to diseases. According to enthusiasts, the government's three billion dollar investment will pay off.

> One of the project's early benefits will be the identification of the single-gene defects believed to account for more than 4,000 inherited disorders and the tools to easily detect them. Drugs may be developed to replace missing or incorrect proteins resulting from genetic errors. Eventually, and most experts say this is quite a ways off, defective genes may be replaced by good ones.[7]

However, we, as humans, have learned from past experiences that the application of new knowledge often has a dark side leading to disaster.

> Perhaps nowhere are the promise of benefit and the risk of harm so great as in genetic research, which raises such questions as *What does it mean to be human?* and *How can human happiness be enhanced?* Some scientists insist that these questions are not scientists' concern. Their job is simply to explore the world in search of new knowledge. It is up to society to use, misuse, apply and misapply that knowledge. But like it or not, the issues are inescapable.[8]

The uniqueness of the Human Genome Project is not its quest for knowledge. The history of science is filled with little else. What is unique is that we, as members of society, must understand that serious ethical and social policy issues are being raised by the project. We must also understand that immediate steps need to be taken to try to ensure that the benefits of the project are maximized, and the potential dark side is minimized.

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[7] Rochelle Green, "Tinkering with the Secrets of Life", Health, January 1990, 46.

[8] George Annas, "Impact of Gene Maps on Law and Society", Trial, July 1990.

Draft Chapter 1

Biological Determinism

Science and technology, definitions of health, disease and illness, and the kinds of medicine we practice are not entirely objective, rational, value-free and culturally neutral. They are shaped, often powerfully, by the culture of a society and, in turn, help to shape the values, attitudes and beliefs of the people living in a particular society during a given historical period. As analyzed by sociologist Howard Kaye, the endeavor to sequence and map the human genome is being shaped by a mechanistic and reductionist world view, which involves a "systematic attempt to reduce biology to the laws of physics and chemistry; organism to program; behavior to genes; life to reproduction; mind to matter; and culture to biology."[1] There has become a conviction that science can, and will, succeed in understanding and precisely controlling nature and the human species through these successive reductionisms. According to Evelyne Shuster,

> The view that humans can ultimately be accounted for solely from their molecular structure has been the central fear, and a reason for society's mistrust of the new biology. This is because reducing humans to molecular components, and the body (once cultural) to biochemical reactions, changes the way we think about ourselves as unique individuals, lessens the value of life and undermines the notions of individual worth, freedom and responsibility.[2]

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[1] Howard Kaye, cited in Judith P. Swazey, "Those Who Forgot Their History: Lessons from the Recent Past for the Human Genome Quest", Gene Mapping: Using Law and Ethics as Guides, eds. George J. Annas and Sherman Elias (New York: Oxford University Press, 1992), 46.

[2] Evelyne Shuster, "Determinism and Reductionism: A Greater Threat Because of the Human Genome Project?", Gene Mapping: Using Law and Ethics as

Biological determinists ask, in essence, *Why are individuals as they are? Why do they do what they do?* And they answer that human lives and actions are inevitable consequences of the biochemical properties of the cells that make up the individual; these characteristics are in turn uniquely determined by the constituents of the genes possessed by each individual. They believe that ultimately all human behavior, hence all human society, is governed by a chain of determinants that runs from the gene to the individual to the sum of the behaviors of all individuals. The determinists believe that human nature is fixed by genes.

It has been argued that biological determinism has been a powerful mode of explaining the observed inequalities of status, wealth and power in contemporary industrial capitalist societies, and of defining human "universals" of behavior as natural characteristics of these societies. Biological determinism is an attempt at a total system of explanation of human social existence, based on the two principles that human social phenomena are the direct consequences of the behaviors of individuals, and that individual behaviors are the direct consequences of inborn physical characteristics. Biological determinism is, then, a reductionist explanation of human life in which the arrows of causality run from genes to humans and from humans to humanity. But it is more than mere explanation; it is politics. For if human social organization, including the inequalities of status, wealth and power, are a direct consequence of our

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Guides, eds. George J. Annas and Sherman Elias (New York: Oxford University Press, 1992), 116.

biologies, then, except for some comprehensive program of genetic engineering, no practice can make a significant alteration of social structure or of the position of individuals or groups within it. What we are is natural and, therefore, fixed. We may struggle, pass laws, even make revolutions, but we do so in vain because we are doomed by our genes. The natural differences between individuals and among groups played out against the background of biological universals of human behavior will, in the end, defeat our uninformed efforts to reconstitute society.

If it were to be placed in a particular school of thought, biological determinism belongs in the Positivist school of Criminology. Taylor et al argue that "positivism saw its role as the systematic elimination of the free-will metaphysics of the Classical school, and its replacement by a science of society, taking on for itself the task of the eradication of crime"[3]. Positivism's major attribute is its insistence on the unity of the scientific method and its application to the study of society and man. Taylor states,

> The positivist asserted that the criminal was propelled by forces of which he was himself unaware. There was no responsibility to judge, or, therefore to investigate questions of motivation. The positivists were concerned, as Durkheim put it, that social life should be explained, not by the notions of those who participate in it, but by more profound causes which are unperceived by consciousness.[4]

The positivist attempts the scientific explanation of crime by arguing that human behavior has the same qualities as other objects

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[3] Ian Taylor, Paul Walton and Jock Young, The New Criminology, (Boston: Routledge and Kegan Paul Ltd., 1973), 10.

[4] Ibid, 22.

in the natural world. In this paradigm, human behavior is to be studied scientifically like the nonhuman world. Human behavior is to be dominated by law-like regularities, and it must possess the predictability of "things". The three central premises of the scientific method, i.e. measurement (quantification), objectivity (neutrality), and causality (determinism) - are based upon a number of postulates: a consensus view of the world, a focus on the criminal actor rather than the criminal act, a reification of the social world, a doctrine of non-responsibility for actions, the inapplicability of punishment, and a faith in the superior, cognitive ability of the scientific expert.[5] Furthermore, Taylor points out,

> The evocation of natural science presents the positivist with a powerful mode of argument. For the system of thought which produces miracles of technology and medicine is a prestigious banner under which to fight. It grants the positivist the gift of 'objectivity'; it bestows on his pronouncements the mantle of 'truth'; it endows his suggestions of therapy, however threatening to individual rights and dignity, with the air of the inevitable.[6]

The nineteenth century's first Positivists searched for scientific proof that crime was caused by characteristics within the individual. They primarily emphasized the mind and the body of the criminal, thus to some extent neglecting the social environment in which the behavior occurred.

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[5] Ibid, 23.
[6] Ibid, 32.

A Historical Perspective

The latter decades of the nineteenth century and the early decades of the twentieth century ushered in many changes to the study of behavior, and in particular, crime. Among these changes was the rise of Social Darwinism, the movement of medicine into the field of behavior and crime, and the genetic theories of Cesare Lombroso. All three changes are inextricably intertwined. Lombroso's genetic theories fitted in very well with the rise of Darwinism, and it could be argued that Lombrosian myth took hold as a result of society's redefinition of crime from being self-determined to biological causes.

Why, however, did the theories of biological positivism and determinism gain such uncontested support? According to Lindesmith and Levin (1937),

> For more than a century, before criminal anthropology came into existence, society's responsibility for its criminal classes had been recognized and embodied in the legislation of all civilized countries. It may be that the theory of the born criminal offered a convenient rationalization of the failure of preventive effort and an escape from the implications of the dangerous doctrine that crime is an essential product of our social organization. It may well be that a public, which has been nagged for centuries by reformers, welcomed the opportunity to slough off it's responsibilities for this vexing problem.[7]

Leon Radzinowicz (1966) concurs and clearly indicates the superior ideological efficacy of biological positivism.

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[7] A. Lindesmith and Y. Levin, "The Lombrosian Myth in Criminology", American Journal of Sociology, 1937, vol 42, 670.

> This way of looking at crime as the product of society was hardly likely to be welcome, however, at a time when a major concern was to hold down the 'dangerous classes'. The concept of the dangerous classes as the main source of crime and disorder was very much to the fore at the beginning of the nineteenth century. It served the interests and relieved the conscience of those at the top to look upon the dangerous classes as an independent category, detached from the prevailing social conditions. They were portrayed as a race apart, morally depraved and vicious, living by violating the fundamental law of orderly society, which was that a man should maintain himself by honest, steady work.[8]

Thus, according to Taylor, "biological determinism has a greater appeal than sociological positivism in that it removes any suggestion that crime may be the result of social inequalities, but rather it is something essential in the nature of the criminal and not a malfunctioning of society."[9]

Physical Characteristics

The belief in anatomical signs of criminal behavior extends back to the very beginnings of speculation on human nature. "It can be detected in Egyptian writings 4000 years old, in Homer's epics, in Hippocratic and Galenic doctrines of ancient medicine, and in the Bible."[10] It is possible that these enduring beliefs are based more on prejudice against the weak, the unattractive and the unusual than they are on science. But from time to time there have been earnest

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[8] Leon Radzinowicz, Ideology and Crime: A Study of Crime in it's Social and Historical Context, (London: Heinemann Educational, 1966)

[9] Taylor, 40.

[10] Encyclopedia Britannica, 1885, vol. 19, 3ff.

efforts to discover and to understand how deeply rooted crime is in a person's nature.

> It is still a question whether crimes are committed by special kinds of people or provoked by special kinds of situations. If it could be shown that criminals are constitutionally indistinguishable from noncriminals then it would seem plausible to suppose that crime results from a criminal's economic, cultural, social and political circumstances, rather than his constitution. On the other hand, showing a constitutional correlate amounts to counter evidence against the purely environmental explanation of crime.[11]

Prior to the rise of modern biology, the focus for the causes of crime was on external characteristics such as facial features, shape of the head, and body type. The problem with this theory is that physical features and behavior must be shown to have a positive causal relationship for it to be a valid theory.

Cesare Lombroso

Cesare Lombroso advanced the first modern theory of crime. He was influenced by the Darwinian doctrine of continuity between man and beast, so it is not surprising that his name became synonymous for all biological theories of criminal behavior, even those which have little in common with it.

"Born in Venice of a Jewish family, Cesare Lombroso (1835-1909) was educated in medicine and became a specialist in psychiatry. His principle career was academic as a professor of legal

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[11] James Q. Wilson and Richard J. Herrnstein, Crime and Human Nature, (New York: Simon and Schuster, 1985), 71.

medicine at the University of Turin,"[12] and he is often considered the founding father of the biological positivist school. An essential clue to understanding Lombroso's work is to recognize that in the last half of the nineteenth century, the answer to the age-old question, "What sort of creatures are human beings?" had begun to depart from the theological answers to answers provided by the objective sciences, particularly biology. It was here that humans' origins as a creature were connected to the rest of the animal world through evolution.[13] No other nineteenth century name is more often associated with this connection than Charles Darwin (1809-1882), the English naturalist who argued that humans evolved from animals.

Lombroso's interest in biological explanations of criminal behavior developed between 1859 and 1863 when he was serving as an army physician on various military posts. During this time, he developed the idea that diseases, especially cretinism and pellagra,[14] contributed to mental and physical deficiencies "which may result in violence and homicide."[15] He used his position as a military physician to measure systematically approximately 3,000 soldiers in order to document physical differences among inhabitants from various regions of Italy. He started to publish his research on the

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[12] George Vold and Thomas Bernard, Theoretical Criminology, (New York: Oxford University Press, 1986), 37.

[13] Ibid, 52.

[14] The *Miriam-Webster Dictionary* defines these as: *cretinism*- a usually congenital abnormal condition characterized by physical stunting and mental deficiency; *pellagra*- a chronic disease marked by skin and digestive disorders and nervous symptoms and caused by a faulty diet.

[15] Marvin K. Wolfgang, "Cesare Lombroso", Pioneers in Criminology, ed., Hermann Mannheim, (Montclair, NJ: Patterson Smith, 1973), 236.

idea that biology could explain criminal behavior in a series of papers that first started to appear in 1861.

Lombroso is probably best known, however, for his notion of the atavist criminal which he first describes in his book, *L'uomo delinquente* (The Criminal Man), published in 1876. In the course of examining many prisoners before and after their deaths, Lombroso became convinced that convicts had distinctive physical features and that there was, indeed, a "criminal man". Lombroso first claimed to have discovered the "secret" of criminality while examining the skull of the famous brigand Vilella. He wrote,

> this was not merely an idea, but a flash of inspiration. At the sight of that skull, I seemed to see all of a sudden, lighted up as a vast plain under a flaming sky, the problem of the nature of the criminal- an atavistic being who reproduces in his person the ferocious instincts of primitive humanity and the inferior animals. Thus were explained anatomically the enormous jaws, high cheek bones, prominent superciliary arches, solitary lines in the palms, extreme size of the orbits, handle-shaped or sensile ears found in criminals, savages and apes, insensibility to pain, extremely acute sight, tattooing, excessive idleness, love of orgies, and the irresistible craving for evil for its own sake, the desire not only to extinguish life in the victim, but to mutilate the corpse, tear it's flesh and drink it's blood.[16]

Late in the nineteenth century, Darwin's theory of evolution was heavily influencing the social sciences. Lombroso's theories complemented Darwinism. "If man did evolve from lower forms of life, as Darwin said, it was easy to suppose that the beastial behavior of some criminals had a physical basis, for animals clearly lacked

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[16] Cesare Lombroso, Introduction to Gina Lombroso-Ferrara, Criminal Man According to the Classification of Cesare Lombroso, (New York: Putnam, 1911), xxv.

human conscience and forbearance."[17] These born criminals could be likened to "throwbacks" from earlier evolutionary periods and to earlier levels of organic and moral development. Atavism was first suggested by Darwin in 1881 when he wrote, "with mankind some of the worst dispositions which occasionally without any assignable cause make their appearance in families, may perhaps be reversions to a savage state, from which we are not removed by many generations."[18] According to Darwin, sloping foreheads, short legs, flat feet, prominent brow, long arms, primitive brains and the like were characteristic of physical atavism.

Lombroso spent years carefully observing and measuring prison inmates and became convinced that the most serious, vicious and persistent criminals, who he believed made up about one-third of all persons who commit crimes, were born criminals. Lombroso maintained that because of their genetic make-up, born criminals could not restrain their violent and animalistic urges. Because the trouble was biological, he argued, little or nothing could be done to cure born criminals; society could be protected only by locking them up.[19]

Lombroso and his students presented a great deal of evidence to support the theory. He claimed that criminals tended to be more ape-like than normal people, having abnormal skulls, huge jaws, flat noses and long arms. However, Lombroso eventually concluded that society was responsible for more crime than evolutionary atavism.

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[17] Wilson, 73.

[18] Charles Darwin, The Descent of Man, (London: John Murray, 1871), 137.

[19] adapted from Lombroso, Chapter 1.

Between the two, however, Lombroso thought he saw evidence for a continuum of "criminaloids". Criminaloids, unlike born criminals, were not doomed to commit crime, but had a criminal tendency that may or may not be triggered by their experiences within their social environments. In other words, criminaloids were born with a "tendency" to commit crime, but if they lived in a moral and fulfilling environment, they would not succumb to crime.

> Whether crime was caused by biology or environment, Lombroso believed that crime was often caused, that it was not an expression of free and malicious intent, as it was and is depicted by many jurists and legal philosophers. The belief in causation was probably Lombroso's most lasting contribution. A causative theory of crime challenged the classical doctrine of "mens rea", the free but "guilty mind" that usually must be established in court before a person can be punished for a crime. Whatever caused the crime, as long as it was caused rather than freely committed, it would not deserve punishment.[20]

Because Lombroso developed a testable thesis, it was later revealed to be incorrect. One of his errors was that he only examined prisoners, thereby suggesting that they all displayed a higher proportion of physical abnormalities than their nonprisoner peers. Lombroso's thesis was found wanting when the British physician Charles Goring (1913) measured nonprison populations. He discovered the same incidence of physical abnormality in nonprison populations as Lombroso had found among convicts. Thus, Goring showed that there was no relationship between physical characteristics and crime.[21]

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[20] Wilson, 74.

[21] Vold, 56.

Even though criminologists have known for more than seventy years that Lombroso was incorrect, they have not ceased to hope that human biology plays a role in crime and deviance. Throughout this century researchers have continued to try to discover and demonstrate such biological differences.

Earnest Hooten

Earnest Hooten, an American anthropologist, attempted through physical anthropology to prove that criminals have inferior physical characteristics. Although he dismissed Lombroso's notion of atavism, Hooten believed that criminals were organically inferior, and this inferiority was genetically inheritable, thus creating a criminal class.

In his 1931 work *Crime and the Man*, he advocated eugenic programs that could identify the inferiors, and enhance policies of sterilization to eliminate crime and criminals. He states,

> If nature can evolve better and more complicated animal organisms through the blind processes of trial and error, natural selection and fortuitous variation, surely man with his comparatively high animal intelligence, with the transmitted cultural knowledge of thousands of years and with a purpose hardened by the realization that the fate of his own species is at stake, can learn the mechanism of human heredity. We can direct and control the progress of human evolution of breeding better types and by the ruthless elimination of inferior types, if only we are willing to found and to practice a science of human genetics. With sound and progressively evolving human organisms in the majority of our species, problems of human behavior will be minimized, and there will

> be improved educability. Crime can be eradicated, war can be forgotten.[22]

Hooten based his views on a twelve year study of more than seventeen thousand people from eight states. Roughly fourteen thousand of his subjects were convicts with the remaining subjects making up a noncriminal control group which included college students, firemen and policemen.[23] Taking elaborate measurements of these individuals, he reached the following conclusions, which he published in a three volume study entitled *The American Criminal: An Anthropological Study* (1939):

> In 19 out of 33 measurements there was a significant difference between criminals and civilians;[24] tattooing is more common among criminals than among civilians;[25] low and sloping foreheads, long, thin necks, and sloping shoulders are similarly in excess among criminals in comparison with civilians;[26] low foreheads, high pinched nasal roots, nasal bridges and tips varying to both extremes of breadth and narrowness, excess of nasal deflections, compressed faces and narrow jaws, fit well into the picture of general constitutional inferiority;[27] physical inferiority is significant principally because it is associated with mental inferiority;[28] the basic cause of the inferiority is probably due to heredity and not to situation or circumstance;[29] a depressed physical and social environment determines Negro and Negroid delinquency to a much greater extent than it does in the case of Whites.[30]

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22 Earnest Hooten, Crime and the Man, (Cambridge, MA: Harvard University Press, 1931), 397.

23 Earnest Hooten, The American Criminal: An Anthropological Study, (Cambridge, MA: Harvard University Press, 1939), vol. 1.

24 Ibid, 229.

25 Ibid, 301.

26 Ibid, 304.

27 Ibid, 306.

28 Ibid, 308.

29 Ibid, 306.

30 Ibid, 388.

The majority of Hooten's work consisted of comparisons between groups of criminals on the basis of the type of offense. He described anthropologically the different types of criminals, such as murderers, rapists and thieves. He concludes that his data shows "tall thin men tend to be murderers and robbers; tall heavy men are killers and also commit forgery and fraud; undersized men are thieves and burglars; short heavy persons commit assault, rape and other sex crimes; whereas men of 'mediocre' body build tend to break the law without obvious discrimination or preference."[31] Hooten further argues that anti-social behavior is something inherent in the individual himself and heritable through the genes. He states,

> Man is the unique animal organism which has been able, comparatively speaking, to dominate and to control it's environment. It is the weaker organism which is molded, distorted and enslaved by environment, and which in the course of natural selection eventually succumbs to that environment, if it is adverse, and becomes extinct. It succumbs not so much because the environment is harsh and unfavorable, but because it is an inferior organism and has lost its power of adaptation. Flawed and weakened structures snap under stress. . . So I think that inadvertently inferior organisms are, for the most part, those which succumb to the adversities or temptations of their social environment and fall into anti-social behavior, and that it is impossible to improve or correct the environment to a point at which these flawed and degenerate human beings will be able to succeed in honest social competition. The bad organism sullies a good environment and transforms it into one which is evil.[32]

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31 Hooten (1931), 376.

32 Ibid, 388.

These and similar conclusions generated severe criticism of Hooten's work, especially the racist overtones and his failure to recognize that the prisoners he studied did not represent criminal offenders who had not been caught, or offenders who had been guilty but not convicted. Hooten did address this issue, however, when he said, "I doubt that any considerable part of the crimes committed in the United States is perpetuated by persons who steadily pursue anti-social careers without ever falling into the clutches of the law. I do not believe that many clever men commit crimes and that only a few of the stupid are caught. Even if this were the case, it would be no more sensible to neglect the study of convicted criminals because some criminals escape conviction."[33]

His control group was also criticized by George Vold (1958) for not being representative of any known population of people. They consisted of Nashville firefighters[34] and members of the militia,[35] each of whom could be expected to have passed rigorous physical examinations which would distinguish them from average males. He also included in his control group beach-goers,[36] mental patients[37] and college students.[38] He offered no explanations as to why these disparate categories of people represented "normal" physical types. He was further criticized for treating some small differences in measurement as greatly significant and for ignoring other differences that were found.

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[33] Ibid, 12.
[34] Ibid, 110, 114-116.
[35] Ibid, 110.
[36] Ibid, 110.
[37] Ibid, 110, 256.
[38] Ibid, 110.

Furthermore, Hooten argued that physical inferiority is inherited, but presented little or no evidence to back up his claim. "As is well known, the state of physical development is greatly influenced by previous conditions of nourishment and other environmental factors. Thus the eleven pound difference in weight he found between the civilians and the prisoners can take on significance only under conditions of a known, standardized diet. This necessary control was ignored."[39]

It is important to notice that despite the stinging criticism received by Hooten and by others who were searching for biological explanations for anti-social behavior and crime, the search, nevertheless, continued and expanded into the 1940's and 1950's.

William Sheldon

The work of William Sheldon shifted attention away from adults to delinquent male youths. His 1949 study entitled *Varieties of Delinquent Youth: An Introduction to Constitutional Psychiatry* was one of the first American efforts at somatotype or body type research. He studied two hundred males between 15 and 21 years of age in an effort to link physiques to temperament, intelligence and delinquency.[40]

> Sheldon took his underlying ideas and terminology of body types from the fact that a human begins life as an embryo that is essentially a tube made up of three different tissue layers,

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[39] Vold, 57.

[40] William H. Sheldon, Varieties of Delinquent Youth: An Introduction to Constitutional Psychiatry, (New York: Harper and Brothers, 1949)

> namely, an inner layer or endoderm, a middle layer or mesoderm, and an outer layer or ectoderm. Sheldon then constructed a corresponding physical and mental typology consistent with the known facts from embryology and the physiology of development.[41]

The following definitions of these presumably fundamental building blocks of body structure are from Sheldon's *The Varieties of Human Physique*:

> *Endomorphy* means relative predominance of soft roundness throughout the various regions of the body. When endomorphy is dominant the digestive viscera are massive and tend relatively to dominate the bodily economy. The digestive viscera are derived principally from the endodermal embryonic layer. *Mesomorphy* means relative predominance of muscle, bone and connective tissue. The mesomorphic physique is normally heavy, hard and rectangular in outline. Bone and muscle are prominent and the skin is made thick by a heavy underlying connective tissue. The entire bodily economy is dominated, relatively, by tissues derived from the mesodermal embryonic layer. *Ectomorphy* means relative predominance of linearity and fragility. In proportion to his mass, the ectomorph has the greatest surface area and hence greatest sensory exposure to the outside world. Relative to his mass, he also has the largest brain and central nervous system. In a sense, therefore, his bodily economy is relatively dominated by tissues derived from the ectodermal embryonic layer.[42]

Sheldon thought a basic temperament accompanied each body type. Ectomorphs were restrained, self-conscious and hypersensitive. Endomorphs were relaxed, food-oriented and even-tempered. Mesomorphs were dominating, assertive, competitive and

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41 Vold, 59.

42 William Sheldon, The Varieties of Human Physique, (New York: Harper and Brothers, 1940), 5-6.

unrestrained.[43] Although the temperaments in themselves were not viewed as criminals, the mesomorphic physique with its corresponding temperament, in combination with certain social factors, was considered to be a precursor to crime or delinquency.

To test his ideas, Sheldon compared two hundred boys committed to the Hayden Goodwill Inn in Boston, Massachusetts with a control group of two hundred supposedly non-delinquent youths. Each person possesses the characteristics of the three body types to a greater of lesser degree. Sheldon, therefore, used three numbers between 1 and 7 to indicate the extent to which the characteristics of the three types were present in a given individual. He found that the delinquent boys were decidedly high in mesomorphy and low in ectomorphy, with the average "physique score" being 3.5 - 4.6 - 2.7, a rather husky male.[44]

Sheldon concluded that boys classified as mesomorphs possessed the physical and psychological characteristics most suitable for delinquency. "The mesomorph's love of adventure, crime and physical prowess, coupled with an insensitivity to other people, tend to produce a predatory person."[45] Although Sheldon realized that it was possible in some instances for these energies to be directed toward legitimate pursuits, he chose what he considered to be a biological "solution" to the crime problem and advocated selective breeding as the only sure means of reducing criminality.

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[43] Sheldon (1949), 14-30.

[44] Ibid, 727.

[45] Albert Cohen, Deviance and Control, (Englewood Cliffs, NJ: Prentice Hall, 1966), 52.

Sheldon's work came under intense criticism shortly after its publication in 1949. Perhaps most damaging was Sheldon's definition of delinquency. It had only superficial resemblance to the customary use of the term in criminology and was vaguely defined as "disappointingness". Therefore, its measurement was virtually impossible. Sheldon's scheme of measuring delinquency resulted in some children who never actually engaged in "delinquent" behavior being classified as "delinquent". Albert Cohen notes, "from the very outset, therefore, any conclusion he might draw about the cases of delinquency are destined to be worthless."[46] Other problems affecting the validity of the study included sampling defects and lack of reliability in assignment of youth to the three physique types.

Sheldon and Eleanor Glueck

Undaunted by William Sheldon's critics, two criminologists, the husband and wife team, Sheldon and Eleanor Glueck employed Sheldon's typology in their attempts to prove a relationship between physical type and delinquency.

"The Glueck's professional life can be divided into two parts, the first as evaluators of the effectiveness of penal institutions in rehabilitating inmates; and the second in identifying those factors that contributed to the onset of criminality. The first part of their professional life began with the publication of *Five Hundred Criminal Careers* in 1930 and continued until 1950."[47] *Five Hundred Criminal*

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[46] Ibid, 52.

[47] William Burger, American Crime and Punishment: The Religious Origins of American Criminology, (Buchanan, MI: Vande Vere Publishing Ltd., 1993), 93.

Careers was designed to assess the rehabilitative effectiveness of penal institutions. "As a result of their study, the Gluecks concluded that the reformatory had failed to reform its charges."[48]

In analyzing their data, the Gluecks became convinced that criminality began at an early age and "their findings led them to believe that they could isolate those characteristics that caused delinquency. Therefore, they believed that they could predict criminal behavior before it occurred."[49] Hence, the Gluecks believed that if criminologists could identify those juveniles most likely to break the law before the violations occurred, then interventions could be taken to prevent future criminality. This is when the Gluecks turned their attention to predicting delinquent behavior.

The Glueck's 1956 book *Physique and Delinquency* is the result of comprehensive research into persistent juvenile delinquency encompassed in their 1950 book *Unraveling Juvenile Delinquency*. It was the Gluecks belief that delinquency was caused by a variety of different factors. In developing a theory of crime causation they stated, "the focus should be upon the selectivity that occurs when environment and organism interact. The searchlight should be placed upon the point of contact between specific social and biological processes as they coalesce, accommodate or conflict in individuals."[50]

In *Physique and Delinquency*, in order to test their theory and belief that they could predict delinquency, the Gluecks compared five

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[48] Ibid, 94.
[49] Ibid, 96.
[50] Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, (Boston, MA: The Commonwealth Fund, 1950), 7.

hundred persistent delinquents with five hundred proven nondelinquents living in the Boston area. The two groups of boys were matched in terms of age, general intelligence, ethnic-racial derivation and residence in underprivileged areas. Photos were mixed together and visually assessed for predominant body type.[51] Extending William Sheldon's work, the Gluecks contrasted the personality and social and environmental characteristics of delinquents and nondelinquents.

After examining the data they collected, the Glueck's concluded:

> The delinquents as a group are distinguishable from the nondelinquents physically, in being essentially mesomorphic; temperamentally, in being restlessly energetic, impulsive, extroverted; in attitude, in being hostile, defiant, resentful, suspicious; psychologically, intending to be direct and concrete rather than symbolic; socio-culturally, in having been reared to a greater extent than the control groups in homes of little understanding, affection, stability or moral fiber by parents usually unfit to be effective guides or protectors. . .[52]

An examination of the overall ratings of the boys indicated that approximately 60 percent of delinquents and 31 percent of nondelinquents were predominantly mesomorphic.[53]

The Glueck's also reported a correspondence between body build and temperament traits. They found mesomorphs to be

> more highly characterized by traits particularly suitable to the commission of acts of aggression (physical strength, energy, insensitivity, the tendency to express tensions and frustrations in action), together with relative freedom from

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[51] Sheldon and Eleanor Glueck, Physique and Delinquency, (New York: Harper and Brothers, 1956), 3-4.
[52] Glueck (1950), 281-2.
[53] Ibid, 284.

> such inhibitions to antisocial adventures as feelings of inadequacy, marked submissiveness to authority, emotional instability and the like.[54]

In behavior, delinquents, as a group, tended to be

> more retarded scholastically, disliked school more markedly, resented its restrictions and were eager to drop out. They were less friendly and more pugnacious to schoolmates. A larger proportion of them than of the control group truanted. They misbehaved seriously or persistently, and as some indication of the deep-rootedness of their emotional difficulties, their misconduct occurred at a much earlier age than among the small number of misbehaving nondelinquents.[55]

Further, they noted that some traits typically uncharacteristic of mesomorphs began showing up in delinquent mesomorphs:

> Susceptibility to the contagious diseases of childhood is one such trait; destructiveness (the tendency to hurt, to destroy) and destructive-sadistic drives; feelings of inadequacy, emotional instability and emotional conflicts characterize the mesomorph and exert a greater criminogenic influence.[56]

The Gluecks mainly referred to body type as a predisposing factor. The potential for delinquency was greater among mesomorphic boys living in environments amenable to criminal activities. In addition, the Gluecks believed that criminal tendencies were found to be rooted in family. "However, the Glueck's did not restrict themselves to investigating only the parents of the delinquents; they also examined their grandparents, aunts and

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54 Glueck (1956), 226.

55 Sheldon and Eleanor Glueck, Delinquents and Nondelinquents in Perspective, (Cambridge, MA: Harvard University Press, 1968), 38.

56 Glueck (1956), 221.

uncles."[57] After comparing the delinquent families with the nondelinquent families they found "the families of the delinquent's parents were more extensively characterized than those of the nondelinquents by mental retardation, emotional disturbances, drunkenness and criminalism."[58] Hence, "not only were the delinquents maladjusted but so were their ancestors. The Gluecks concluded that criminality and other forms of dependency extended from one generation to another and, therefore, was almost an inherited quality."[59]

The Glueck's conclude,

> the mass impact of the external societal environment, or the general culture, is less significant in generating delinquency and extending it into criminal recidivism than are the biological endowments of the individual and the parental influences of the formative years of early childhood.[60]

In keeping with the positivist school of thought, the Gluecks employed the scientific method in all of their studies of delinquency. To the Gluecks, the scientific method "produced not only knowledge, but it also provided the solution to social ills. Its assumption of predictability coupled with statistical procedures would provide the solutions for all of society's ills."[61] The Gluecks believed "man did not control his behavior; criminality was not learned, it was

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57 Burger, 98.
58 Glueck (1968), 16.
59 Sheldon and Eleanor Glueck, Of Delinquency and Crime: A Panorama of Years of Search and Research, (Springfield, IL: Charles C. Thomas Co., 1974), cited in Burger, 98.
60 Glueck (1968), 170.
61 Burger, 100.

predetermined."[62] Thus, their research had two primary goals: "first, to prove that man is, by nature, a born criminal, and second, to absolve society from any role in criminal behavior since it is not social immorality but individual maladjustment that causes crime."[63]

There are, however, many problems associated with the Glueck's research. It has been argued that they did not consider the likelihood that mesomorphs might have been over represented in delinquent activities for purely social reasons. Past research suggests organized delinquent subcultures recruit youth with physical prowess. Today, however, with the use of weapons, there may be little relationship between recruitment into a group and physique since it takes little strength to pull a trigger. In addition, Albert Cohen has pointed to several methodological weaknesses including "the selection and matching of delinquent and non delinquent subjects and uncontrolled subjectivity in the somatotyping procedure."[64] Vold concurs when he argues, "there was no control for the rapid body changes that occur in adolescence; the method of somatotyping involved only visual assessment and not precise measurements; and the delinquent population included only institutionalized youth."[65] Finally, and most importantly, the Gluecks never explained how they determined that anatomical characteristics produced delinquency.

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62 Ibid, 101.
63 Ibid, 101
64 Cohen, 78.
65 Vold, 62.

Conclusion

As we have seen, theories that focus on physical characteristics and biological explanations for abhorrent or anti-social behavior have serious problems, namely the extent to which biological differences explain differences in human behavior. Notably, as America pushed into the twentieth century, the appeal of biologically oriented theories eventually began to diminish. In their place, more optimistic positivist theories emerged which drew their ideas from psychology and especially from sociology. These newer approaches argued that the troubles of criminals could be rectified through counseling or by fixing the social environments in which they lived.

However, while the ideas of the early positivist theorists declined in popularity, we are now seeing a renewed interest in the idea that the origins of human behavior lie in unchangeable characteristics of individuals. The 1980's have brought a revitalization of the view that criminals are wicked by nature, a view that has had questionable, if not disquieting, policy implications. It may be that the information produced by the Human Genome Project could be used to further these biological/behavioral theories of human differences.

Draft Chapter 2

Eugenics
(in relation to the Human Genome Project)

The social power of genetic information is not something that was discovered in recent years. Eugenic ideas go back at least to Plato, but in its modern version, eugenics originated with Francis Galton, a younger cousin of Charles Darwin and a brilliant scientist in his own right. In 1883, Galton coined the term "eugenics" to designate "the study of the agencies under social control that may improve or impair the racial qualities of future generations, either physically or mentally."[1] However, eugenics was more than a field of study. It became a popular political movement, providing counsel to governments on questions ranging from immigration and abortion to penal reform and psychological asylum.[2]

Galton's eugenic ideas were especially powerful after the turn of the nineteenth century in the United States, Britain and Germany. "The backbone of the movement was formed of people drawn from the white middle and upper classes, especially prominent laymen and scientists, particularly geneticists and often physicians."[3] It was not uncommon to find eugenicists denigrating the masses ("our

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1 Francis Galton, Inquiries into the Human Faculty, (London: Macmillan, 1883), 44.

2 Robert N. Proctor, "Genomics and Eugenics: How Fair is the Comparison?", Gene Mapping: Using Law and Ethics as Guides, eds., George J. Annas and Sherman Elias, (New York: Oxford University Press, 1992), 59.

3 Daniel J. Kevles, "Eugenics and the Human Genome Project: Is the Past Prologue?", Justice and the Human Genome Project, eds., Timothy F. Murphy and Marc A. Lappe, (Berkeley: University of California Press, 1994), 15.

idiotic public" as eugenicist Prescott F. Hall described them),[4] and they commonly believed that the upper classes "contain much of the best [hereditary] ability in our population."[5] Charles Davenport, head of the Eugenics Record Office in the United States, argued that the lower class was composed of individuals with inferior genes.[6] In entertaining these biases, eugenicists were reflecting not only their own, but the cultural consciousness of that period. As members of elites or aspiring members of elites, they had a vested interest in maintaining the superiority of these groups.

Most particularly, eugenicists were concerned with preventing social degeneration which they found to be manifested in urban and industrial societies. For example, crime, slums and rampant disease were attributed to biological causes or "bad blood". A substantial part of the program was dedicated to analyzing the traits that were alleged to create social problems-

> traits involving qualities of temperament and behavior that might lie at the bottom of, for example, alcoholism, prostitution, criminality and poverty. A major object of scrutiny was mental deficiency, then commonly termed "feeblemindedness", which was often identified by intelligence tests and was widely interpreted to be at the root of many varieties of socially deleterious behavior.[7]

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[4] Prescott F. Hall to E.A. Ross, October 18, 1914, EAR, cited in Kenneth Ludmerer, Genetics and American Society: A Historical Appraisal, (Baltimore, MD: John Hopkins University Press, 1972).

[5] Warren S. Thompson, "Race Suicide in the United States", American Journal of Physical Anthropology, 3 (1920), cited in Ludmerer, Genetics and American Society: A Historical Appraisal, (Baltimore, MD: John Hopkins University Press, 1972), 20.

[6] Charles B. Davenport, Heredity in Relation to Eugenics, (New York: Henry Holt, 1911), 8, 80.

[7] Kevles, 15.

Implicit in the work of most eugenicists was a set of racial fears: that "racial poisons" (especially alcohol, tobacco, narcotics and syphilis) were threatening the health of the race, that the criminal, mentally ill and morally unfit were outbreeding the more upstanding members of society leading to what sociologist Edward A. Ross labeled "race suicide". Proctor states,

> eugenicists feared that the comforts of human civilization- notably welfare and medical care for the weak- had begun to erode the competitive struggle that normally maintains the fitness of animal populations; eugenicists worried that human compassion was allowing "subnormals" to survive and reproduce who otherwise, in a state of nature, would never have lived to bear children.[8]

Eugenicists believed that strong biological measures were needed to remove these inferior people from the pool of potential breeders and to encourage "the fit" to breed their own kind.

From around 1905 to the early 1930's, eugenicists in the United States proposed a two-part policy to upgrade the hereditary quality of the American people. One part was termed "negative eugenics", which called for the elimination of undesirable traits from the population by discouraging "unworthy" parenthood. Through appropriate measures, including marriage restriction, sterilization, and permanent custody of defectives (i.e. institutionalization), eugenicists hoped to prevent an increase of "undesirables" in the population. The second part of the policy was termed "positive eugenics" in which there was an effort to increase desirable traits in the population by encouraging "worthy" parenthood.

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[8] Proctor, 60.

The sociologist Edward A. Ross was of the same mind as many of America's prominent eugenicists. He advocated programs of positive eugenics in controlling the inferior races immigrating into the United States. He believed that "the more advanced members of the state needed to produce more children to offset the negative effects that the lower race would have upon social morality."[9] Furthermore, he believed that if inferior races became too great in numbers, it would result in America's suicide:

> The higher race quietly . . . eliminates itself rather than endure individually the bitter competition it has failed to ward off by collective action. Hence, this race suicide would occur because the less future-oriented individual was more likely to be governed by desires of the flesh than native Americans, that is Nordic immigrants and their descendants, and therefore produce more children.[10]

In practice, little was done for positive eugenics. "Since the technical and social difficulties facing positive eugenics were so great, most eugenicists felt no more could be done than to educate the public on the 'facts' of hereditary and hope that 'superior' couples would heed the message and have more children."[11] Much more was done for negative eugenics, most notably the passage of eugenic sterilization laws. According to Kevles,

> by the late 1920's, some two dozen American states had enacted such laws. The laws were declared constitutional in the 1927 United States Supreme Court decision of *Buck v. Bell*, in which Justice Oliver Wendell Holmes delivered the opinion

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9 E.A.Ross cited in William Burger, American Crime and Punishment: The Religious Origins of American Criminology, (Buchanan, MI: Vande Vere Publishing Ltd., 1993), 66.

10 Ibid, 66.

11 Kenneth M. Ludmerer, Genetics and American Society: A Historical Appraisal, (Baltimore, MD: John Hopkins University Press, 1972), 8.

> that three generations of imbeciles were enough. The leading state in this endeavor was California, which, as of 1933, had subjected more people to eugenic sterilization than had all other states of the union combined.[12]

Despite their continual examination of the details of the eugenics program, most eugenicists never examined the deeper ethical and scientific assumptions of the movement. Few eugenicists ever bothered to consider such troublesome matters as whether their "breeding programs" could be justified technologically in light of the recent findings in genetics,[13] or whether men really possess the wisdom to decide which traits are desirable.

Before continuing, however, it is important to examine the origins of the eugenic movement in order to understand why eugenic ideas proved so popular and unchallenged.

The History Behind the Eugenics Movement

Though the idea of improving the hereditary quality of the human race dates back as far as Plato's *Republic*, the modern concept of eugenics began to be discussed during the second half of the nineteenth century. Underlying the early modern interest in eugenics was a philosophical belief in the notion of human perfectibility. Ludmerer contends,

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[12] Daniel J. Kevles, In the Name of Eugenics: Genetics and the Uses of Human Heredity, (New York: Knopf, 1985), 61-62.

[13] Some of these findings are: "the development of the theory of the gene; the elucidation of the physical basis of inheritance; the demonstration that mutations of the gene can be artificially produced by irradiation; the development of population genetics into a sophisticated science; as well as important advances in psychology and anthropology" -Ludmerer, 9.

> even in the eighteenth century such thinkers as Voltaire, Rousseau and Condorcet had advanced this sentiment, and throughout the nineteenth century Western Man continued to pay homage to that ideal. The Industrial Revolution, in emancipating humanity from an agricultural existence, undoubtedly helped foster an early attitude of optimism, of hope for a golden future, of human perfectibility in the consumption of material goods.[14]

By the 1880's, spurred on by Francis Galton, talk of eugenics was commonplace. Galton's ideas, a logical outgrowth of Charles Darwin's theory of evolution, prospered at a time when it was becoming popular to apply the doctrine of evolution to non-biological situations. One result of this way of thinking was the development of "Naturalism". Naturalists, as evolutionists, would argue that "society progresses in accordance with its own lawful properties toward an ideal state. Interference in this necessarily painful process of social development would only be futile and dangerous."[15] No part of this naturalistic world-view enjoyed greater influence in America during the late nineteenth and early twentieth centuries than the analogy between society and biological organisms.

Herbert Spencer further advanced this idea of naturalism in what was often referred to as "Social Darwinism". "Social Darwinism was based on the principle of evolution as being universal law. Spencer explained all evolution, cosmic, biological and social, with a single basic principle; things move from the simple and unorganized

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[14] Ludmerer, 10.

[15] William Dan Perdue, Systemic Crisis: Problems in Society, Politics and World Order, (Ft. Worth: Harcourt Brace Jovanovich, 1993), 16.

to the complex and organized."[16] Furthermore, competition was regarded as the key to progress. Social Darwinists were against any attempt by the government to legislate social reform; government welfare programs then represented an infraction of individual liberty and by favoring the "unfit", interfered with the process of human evolution. Spencer identified the "unfit" with the poor, whom he felt may be safely left to die out. "Thus, Social Darwinism required no apology, for the withering and unfit left behind a more perfect hierarchy."[17] In essence, Social Darwinism represented a major attempt to apply the methods and discoveries of biology to the analysis of non-scientific issues. Social Darwinism could further be used to boost the prevailing political mood of the era where its catch phrases of "survival of the fittest" and "struggle for existence" gave biological force to the notion that nature allows only its fittest members to survive and that such competition results in social progress.

Before 1900, despite the popularity of the naturalistic viewpoint and the urgings of Francis Galton, an organized eugenics movement did not develop in the United States. At this time the lack of knowledge about the process of inheritance impeded its growth. However, with the birth of genetics, mere interest in eugenics was transformed into a stable, institutionalized movement. "In providing a long-sought explanation for the transmission and distribution of traits from one generation to the next, Mendel's laws enabled eugenic

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16 Randall Collins and Michael Makowsky, The Discovery of Society, (New York: Random House, 1989), 89.

17 Perdue, 16.

proposals to be appreciated on a heretofore impossible scale."[18] At a time when many Americans were preoccupied with what they considered to be a sharply rising increase in physical and mental degeneracy in the country, and when many feared that civilization was interfering with natural selection, the study of eugenics offered a scientific solution compatible with the world view of the naturalistic mind.

The Modern Eugenics

With the discovery of genetics, many individuals started speaking of its social import and potential applicability to social problems. Across the world, organizations arose that were devoted to eugenic purposes. Despite the differences among these various eugenic societies, all of them were devoted to the popularization of genetic science, urging that social legislation be guided by what they considered biological wisdom.

One of the pillars of eugenic ideology was "biological determinism"- the idea that biology is at the root of most human talents and disabilities. Especially after 1900, with the rediscovery of Mendel's laws,[19] eugenicists assumed that it was to genetics that we must look for the causes of crime, mental illness and social deviance. Eugenicists tended to exaggerate the extent to which human behavior, human disease and human institutions are

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18 Ludmerer, 13.

19 Gregor Johann Mendel posed three postulates or principles of inheritance: unit factors exist in pairs; there is dominance and recessiveness in the two unit factors; and segregation, where the pair splits up and one goes to the gametes.

biologically rooted. Traits as diverse as hernias, wanderlust and divorce were assumed to be genetic.

> In fact, a chart displayed at the Kansas Free Fair in 1929, purporting to illustrate the "laws" of Mendelian inheritance in human beings, declared, "unfit human traits such as feeblemindedness, epilepsy, criminality, insanity, alcoholism, pauperism and many others run in families and are inherited in exactly the same way as color in guinea pigs."[20]

As stated before, at the root of the eugenics movement was fear: fear that the unsavory members of society would outbreed the upstanding members of society, who felt their social positions and status were being threatened. Eugenic policies were designed to combat those fears.

To most eugenicists, the movement was not just a social crusade but a moral crusade as well. "Eugenicists envinced their concern for moral intangibles in their consideration of eugenics as the key, not only to the physical betterment of mankind, but also to the intellectual and moral advancement of the race."[21] As one eugenicist put it, "biological facts clearly indicate that only through the application of eugenic measures can man reach a permanently higher plane of intellect and morals."[22]

The dedication of most eugenicists to the moral crusade of eugenics was limitless. The sociologist Edward A. Ross argued that "interest in eugenics is almost a perfect index of one's breadth of outlook and unselfish concern for the future of our race."[23] Irving

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20 Kevles, In the Name of Eugenics, 60.

21 Ludmerer, 17-18.

22 Statement by Charles F. Dight, in "What I Think About Eugenics", 8.

23 Statement by E.A.Ross, in "What I Think About Eugenics", 3.

Fisher, a Yale University economist, wrote, "I believe eugenics is incomparably the greatest concern of the human race."[24] The dedication of the eugenicists was in one sense the greatest strength of the movement. On the other hand, their conviction was also one of its greatest weaknesses, because many eugenicists possessed a moral absolutism so strong that they lost the ability to distinguish reality from fantasy. Many eugenicists were so consumed with moral righteousness that they often seemed blind to some of the difficulties they faced. It was as if they already possessed the "Truth" and saw little need to re-examine their assumptions.

Furthermore, eugenicists possessed a racial as well as a class bias. They were evolutionists who regarded the Anglo-Saxon or Nordic type dominating world affairs as nature's "fittest race". According to Perdue,

> Social Darwinism provided legitimacy to the notion that ethnic minorities and the poor were lower on the evolutionary ladder and less fit in moral development than the dominant Anglo-Protestant majority. Coupled with a growing concern for preserving the Anglo-Saxon culture against the "depravity" of the expanding immigrant population, Social Darwinism provided a foundation for the trend toward "Americanization."[25]

Eugenicists expanded early race classification theories and cast them into an evolutionary framework. Following a common misinterpretation of Darwinism, they argued for a "unilinear vertical

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24 Statement by Irving Fisher, in "What I Think About Eugenics", 5.
25 Perdue, 180.

progression from the lowest to the highest." Ludmerer further contends,

> they considered the Negro race biologically inferior to the Mongoloid race, which they in turn deemed inferior to the exalted Caucasian race. Within the white race they felt there existed a three-fold classification consisting of the Mediterraneans, the Alpines and the Nordics. According to this scheme, the Mediterraneans, who populated southern Europe, were a long-skulled race of dark complexion and short, slight stature. The Alpines, a round-skulled people of medium height, sturdy build and intermediate complexion, inhabited the central and eastern regions of Europe. In the northern parts of Europe lived the long-skulled Nordics, a very tall race of blue-eyed blondes. Nordics were Protestants; Alpines and Mediterraneans were Catholic. In general, eugenicists believed that the Nordic race possessed a monopoly of desirable characteristics, physical and mental, thereby standing as the superior race. They regarded these racial traits to be firmly and immutably established by heredity, insensitive to change or modification through environmental influences.[26]

For a time this view of race held a strong appeal to many Americans. Many of the upper and middle class were xenophobic, that is, they felt threatened by the increasing numbers of immigrants pouring into the country. They believed their traditional leadership, prestige and position were in jeopardy.

"In 1910 the Dillingham Commission, a federal commission which had been established in the United States in 1907 to study immigration to the United States, released its widely publicized report which concluded that immigrants from Mediterranean regions were biologically inferior to other immigrants."[27] It was argued that

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[26] Ludmerer, 22.

[27] Ibid, 25.

if "biology" truly did indicate non-Nordic races had undesirable characteristics which did not respond to environmental influences to change, then immigrants could not be assimilated into the American population, and that immigrants outbreed the American native, thus they (immigrants) should not be admitted into the country. Thus began the push for restrictions on immigration.

Nonetheless, the American public, as a whole, was ready to consider selective immigration only following the conclusion of World War I, but these eugenicists had been pushing for such action for nearly 25 years. To eugenicists, the non-Nordic immigrant provided a convenient and self-serving explanation for society's, and their own, ills. "A eugenic immigration restriction law seemingly provided a solution to America's social problems without making necessary a change in the structure of society."[28]

However, before 1900, despite the popularity of the naturalistic viewpoint and the urgings of Francis Galton, an organized eugenics movement did not develop in the United States. At this time the lack of knowledge about the process of inheritance impeded its growth. Nothing was known about the physical basis of heredity and biologists had no rule governing the transmission of traits from one generation to the next. With the birth of modern genetics, the undercurrents of interest in eugenics were transformed into a stable, institutionalized movement. Early investigators of heredity, men who could understand the implications that Mendel's laws held for man, were pioneers for organizing the movement in the United States. Although their percentage among the eugenicists was small, a

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[28] Ibid, 33.

considerable number of geneticists, attracted by the idea of applying genetic knowledge to human problems, took part in the movement and during its early years constituted an important nucleus and helped bring the eugenic cause some measure of scientific legitimacy.

The Geneticists

Between the years 1900 and 1915, a high percentage of geneticists began to take an interest in eugenics. Alarmed by what they considered to be a decline in the hereditary quality of the American people, they joined the movement and supported its program of positive and negative eugenics in hope that they could help reverse this trend. As enthusiasts, their interest contributed to the movement's rapid growth. While the intellectual and social climate heightened their interest, discoveries within the field of genetics acted as the deciding factor in their involvement with the movement.

The first of these crucial findings was the rediscovery of Mendel's laws. "By providing a long-sought explanation for the transmission and distribution of traits determined by single genes from one generation to the next, Mendel's laws permitted geneticists to make predictions about the number and types of offspring to be expected from different types of matings."[29] Of course, all of the experiments thus far had been done using plants and animals as the subjects of study. Many geneticists quickly became enthusiastic

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[29] Ibid, 38.

about the possibility of extending Mendel's laws to the betterment of human beings.

The second important development was the belief that all traits were determined by single genes acting independently of one another. "Thinking that a one-to-one correspondence exists between genes and observed traits, they felt certain that Mendel's laws explained the transmission of almost all characteristics."[30] Thus, the geneticists believed that they had adequate knowledge to create sound eugenics programs.

The third important development was the acceptance of the theory of August Weismann. He produced experimental evidence in the late 1880's which indicated that traits or characteristics acquired by a person due to environmental influences could not be inherited by his or her descendants. Ludmerer comments,

> Weismann's work quite legitimately had the effect of discrediting the prevailing belief among biologists in the inheritance of acquired characteristics. Furthermore, Weismann's theory had a profound impact upon the social views of many geneticists because they tended to view his work as proof of the predominance of hereditary over environment. In acknowledging his theory, many of them for a time became pessimistic about the possibility of improving defective individuals through environmental agencies, a pessimism which heightened their interest in eugenics as a method to improve the race.[31]

Genetic findings thus served to push aside previous speculations about the value of eugenics by putting it in a quantifiable, biological framework.

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[30] Ibid, 39.
[31] Ibid, 39.

In reviewing the movement, one is left with a realization of the fundamental paradoxes in the eugenicist's world view: their worship of science coupled with their limited understanding of the genetic framework upon which they based their programs; their appeal to education in trying to promote popular acceptance of their ideas; their own passionate, yet irrational commitment to the eugenic programs; their conviction in the soundness of Social Darwinistic principles and their advocacy of state control as a means to achieve eugenic goals.

The Social and Policy Implications of Eugenics

The most powerful union of eugenic research and public policy occurred in Nazi Germany. Much of the eugenic research in Germany, both before and during the Nazi period, was similar to that in the United States and Britain; however, during the Hitler period, Nazi bureaucrats provided substantial support, monetary and otherwise, for eugenic research. Proctor states,

> Germany's research programs were expanded to complement the goals of Nazi biological policy, exploiting ongoing investigations into the inheritance of disease, intelligence and behavior to advise the government on it's sterilization policy. In Germany, where sterilization measures were partly inspired by the California law, the eugenics movement prompted the sterilization of several hundred thousand people and helped lead to the death camps.[32]

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[32] Robert N. Proctor, Racial Hygiene: Medicine Under the Nazis, (Cambridge, MA: Harvard University Press, 1988), 292, 307.

Hence, it is obvious how the power of genetic information, or misinformation, can influence public policy in a way which can be devastating to whole populations of people- in this case, the Jews.

Since the beginning of the DNA era, many have wondered whether new genetic knowledge will be deployed for positive eugenics, for attempts to produce a super race or at least to engineer new Einsteins or Mozarts. Conferences on the Human Genome Project almost inevitably produce fear that the state will seek to foster or enhance a variety of highly valued human qualities. However, it is doubtful that advances in genetic knowledge will lead to a revival of attempts to produce a "super race" most likely because both scientists and the general public fear a revival of Nazism and Hitlerian philosophy. While the Human Genome Project will undoubtedly accelerate the identification of genes for physical or medical traits, it is unlikely to reveal with any speed or certainty how genes contribute to the formation of those qualities- talent, behavior, personality- that the world so admires. Equally important, "the engineering of designer human genomes is not possible under current reproductive technologies and is not likely to grow much easier in the near future."[33] Positive eugenics, then, does not elicit as much concern and worry as does its counterpart, negative eugenics.

Many commentators, such as the late Nobel Laureate biologist Salvador Luria, and advocates of rights for the disabled, such as Barbara Faye Waxman, have cautioned that the Human Genome Project is likely to foster a revival of negative eugenics. "Since it will,

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[33] Winfred Malone, scientist at the Cancer Research Institute, Division of the National Institutes of Health, personal interview, 21 June 1995.

in principle, be easy to identify individuals with deleterious genes of a physical, or presumptively antisocial, type, the state may intervene in reproductive behavior so as to discourage the transmission of these genes in the population."[34] Indeed, an article on the first page of the New York Times on August 15, 1991 states,

> in 1988, China's Gansu Province adopted a eugenic law that would (so authorities say) improve "population quality" by banning the marriages of mentally retarded people unless they first submit to sterilization. Since then, such laws have been adopted in other provinces and have been endorsed by Prime Minister Li Peng. The official newspaper *Peasants Daily* explained, "Idiots give birth to idiots."[35]

More recently, in April 1991, at an exposition in Paris titled *La Vie en Kit (Life in a Test Tube)*, writer Monette Vaquin expressed ethical worries about the Human Genome Project when she said:

> Today, astounding paradox, the generation following Nazism is giving the world the tool of eugenics beyond the wildest Hitlerian dreams. It is as if the unthinkable of the generations of the fathers haunted the discoveries of the sons. Scientists of tomorrow will have a power that exceeds all the powers known to mankind: that of manipulating the genome. Who can say for sure that it will be used only for the avoidance of hereditary illnesses?[36]

Vaquin's apprehensions, echoed frequently by scientists and social analysts alike, indicates that the shadow of eugenics hangs over any discussion of the social implications of human genetics, but particularly over consideration of the potential impact of the Human Genome Project.

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[34] Kevles, "Eugenics and the Human Genome Project", 19.

[35] The New York Times, 15 August, 1991, 1.

[36] La Vie en Kit: Ethique et Biologie (Paris: L'Arche de la Defense, 1991).

The relevance of eugenics for the present is severalfold. At one level, it presents a dramatic case of how genetic knowledge (and genetic ignorance) can be coupled with repressive state policy to deprive individuals of rights and liberties. It also illustrates how scientists may lend their support to political movements, giving them an air of respectable legitimacy. Science has often served as a vehicle for the carriage and transport of popular prejudices against racial, religious and ethnic minorities.

Economics may well prove to be yet another powerful incentive to a new eugenics. Undoubtedly, concern for financial costs played a role in the eugenics movement. The social pathologies of the early twentieth century were said to be increasing at a costly rate. Thus, it was reasoned, eliminate bad genes from the gene pool, and you would reduce what are now called state and local welfare costs, by reducing public expenditures for "feeblemindedness" in its public institutional settings.

In our own day, the more that health care in the United States becomes a public responsibility, payable through the tax system, and the more expensive it becomes, the greater the possibility that tax payers will rebel against paying for the care of those whom genetics dooms to severe disease or disability.

The more that is learned about the human genome, the more it will become obvious that we are all susceptible to certain kinds of genetic disease or disabilities. Since everyone is in jeopardy of contracting a genetically-based illness, then everyone would have an interest in a well-financed public health program. However, not

everyone carries the same genetic load, and some illnesses are more costly than others.

It is likely, then, that on the grounds of cost, some people would be discriminated against. Public policy, then, might pressure people not to bring genetically inferior children into the world- not for the sake of the gene pool, but in an effort to keep public health costs down.

All this said, however, it is far-fetched to expect a Nazi-like eugenics program to develop in the contemporary United States as long as political democracy and the Bill of Rights remain. Awareness of the cruelties of state-sponsored eugenics in the past has tended to set most geneticists and the public against such programs. Also, handicapped and diseased persons, as well as minorities, have considerably more political power today than they did in the early part of this century. They may not be empowered enough to block all quasi-eugenic threats, but they are positioned well enough politically to at least hinder eugenic proposals that may affect them.

The biological determinism that underlay the 1930's eugenic movement has by no means disappeared. Genetics remains very much a "science of inequality" in so far as the more we look at differences, the more likely we are to find them. In the face of unequal powers and unequal access, there is a great danger of exaggerating the extent to which human behavior is rooted in the genes. Scientists still work to prove that intelligence, alcoholism, crime, depression, homosexuality, female intuition and a wide range of other talents and disabilities are the inflexible outcomes of human genes, hormones, neural anatomy or evolutionary history. "Galton's

eugenics survives more modestly in the IQ tests that govern people's passage through our educational bureaucracies. There is a new Machiavellianism that treats people merely as means to ulterior ends; because it understands some of people's weaknesses and susceptibilities, it is willing to treat their lives as humanly worthless."[37]

The danger in the Human Genome Project centers on who defines what a "normal" genome is, and what the unwanted genes are. The dark spectre of eugenics is inevitably raised when science anticipates the ability to change everything from physical traits to personality and behavior.

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[37] Collins and Makowsky, 97.

Draft Chapter 3

The XYY Controversy

An excellent example of what may happen when genes are held responsible for anti-social or aberrant behavior is the XYY controversy. Although no conclusive evidence was found to link behavior to an extra Y chromosome, many women still make procreative decisions based on these dubious studies.

> In 1961, a tall, healthy, normal-looking middle-aged man- with a history, it seems, of barroom brawling, especially during his youth- underwent a series of medical tests to determine why he had recently fathered a genetically abnormal child. The tests did not identify the cause of the baby's illness. But they did inadvertently reveal something that astonished the man's doctors. Every somatic cell in his body had one too many chromosomes- 47- and in a combination, or genotype, that had never before been reported in the literature of medicine.[1]

In short, the man's genotype was 47, XYY. In addition to the normal 46 chromosomes, (44 autosomes and 2 sex chromosomes, X and Y), he had an extra Y chromosome. The XYY genotype is a relatively rare chromosomal condition, occurring in about one in a thousand infant males. It is caused by a failure of the chromosomes to separate properly in the meiotic phase of development and is called nondisjunction.

Less than a year after discovering the XYY genotype, the proposition was put forward that this genotype might possibly be linked to a life of crime. On December 25, 1965, the prestigious

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[1] David Suzuki and Peter Knudtson, Genethics: The Clash Between the New Genetics and Human Values, (Cambridge: Harvard University Press, 1989), 142.

British journal, *Nature*, published a short article that sparked more than a decade of fierce debate and controversy about the so-called XYY syndrome. Titled, "Aggressive Behavior, Mental Subnormality and the XYY Male", it described a recent survey of the karyotypes of 197 men, all patients in Carstairs, a high-security mental hospital in Scotland. These men were chosen because their presence in this hospital marked them as "mentally-subnormal" with dangerous or violent tendencies. 3.5% turned out to have the XYY genotype.[2] Patricia Jacobs, author of the article and cytogeneticist, also noted that her XYY subjects were noticeably taller (over 6 ft.) than genetically normal males. More interesting, however, in this study was the discovery of the uniform history of mental illness, aggression or both in all its subjects. Thus, the XYY genotype became associated with mental defects and male aggression.

The first documented XYY case had not been diagnosed on the basis of physical or behavioral symptoms, but by accident. Nor did Jacob's study establish a firm causal link between XYY genotype and aggressive behavior. According to Suzuki,

> Part of the excitement over the XYY syndrome lay in the hope that it might eventually shed light on broader questions about the genetic basis of behavior in normal XY males. The line of reasoning went something like this: Men have a Y chromosome that women lack. Men tend to be more aggressive than women. If the Y chromosome were instrumental in altering sex-related bodily characteristics- from beard and biceps to the male sex organ- perhaps it was also essential for some of the behavioral patterns we consider masculine. And if it were, perhaps the newly discovered XYY

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[2] Alan M. Dershowitz, "Karyotype, Predictability and Culpability", Genetics and the Law, eds., Aubrey Milunsky and George Annas, (New York: Plenum Press, New York, 1976), 65.

> male- a "supermale" with his double dose of the masculinizing Y chromosome- would serve as a natural test case to examine that hypothesis.[3]

Thus, the seeds for debate were sown simply by the nature of the Jacob's study. Clearly, if karyotyping could be used to screen a population for early genetic indicators of anti-social behavior, it would be of tremendous interest to police and other security forces. Such a program could also become a dangerous precedent leading to increased efforts to link other socially unacceptable behaviors such as alcoholism, drug abuse and homosexuality to genetic markers that could be screened.

There are a couple of problems and ill-fated consequences associated with Jacob's initial study of the XYY syndrome, as it was then being called. First of all, the Jacobs study set out to establish a genetic basis for forms of behavior considered negative to most people. From the beginning, the XYY genotype was associated with disturbed, violent men in high-security insane asylums. Anyone found to possess the genotype was automatically labeled as violent or mentally ill, whether it was true or not. "But once a young boy, for instance, was found to possess a XYY genotype, he could be marked for life- burdened with an unearned scarlet letter in the form of a second, or supernumerary, Y."[4]

Secondly, and most importantly, the Jacobs study and the ones that followed, failed to include XYY males who were free and functioning normally in society. By focusing exclusively on inmate

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[3] Suzuki, 148-9.
[4] Ibid, 150.

populations, the studies gave the appearance of genetic confirmation that there was a biological basis for their subjects' anti-social, aggressive behavior. At the same time, researchers neglected to take into account the environmental factors that could have contributed to their subjects' behavior.

Jacob's 1965 study was followed by a surge of similar studies, all of which eagerly embraced Jacob's aggression hypothesis, in mental hospitals and penal institutions worldwide. Many confirmed a disproportionately high number of XYY males, but none succeeded in finding a causal connection between chromosomes and crime. Nonetheless, these studies received a great deal of media attention. Kevles contends,

> Many reports were untrue and later retracted, but they fed a growing public perception that populations of XYY men not only were "genetically driven" to lives of violence and crime but also might represent a hidden menace to society. Some scientists even began to propose genetic screening programs designed to diagnose the XYY abnormality prenatally. Since there existed no medical remedy, the implication was that informed parents would choose to abort their unborn XYY males before their offspring could mature to act out their presumably genetically preprogrammed "behavioral fate."[5]

This idea of aborting XYY male babies was now becoming eugenically sound.

By 1968 defense attorneys in Australia and France had already tried to take advantage of the misconception by requesting reduced sentences for clients on trial for murder simply by showing them to

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[5] Daniel J. Kevles, In the Name of Eugenics: Genetics and the Uses of Human Heredity, (New York: Knopf, 1985)

be 47, XYY.[6] During the late 1960's, a United States government agency called the Center for Studies of Crime and Delinquency began funding projects to mass screen XYY juvenile males being held in detention and treatment facilities in Maryland. And in 1969, it sponsored a major conference on XYY research, lending scientific legitimacy to the connection between XYY men and crime.[7] By the early 1970's, maternity hospitals in the United States, Canada, Denmark and England had begun to permit mass screening of newborn infants to see if they were 47, XYY. They justified this by arguing that even if the XYY genotype could not yet be conclusively linked to criminal aggression, the parents had a right to know that such a possibility existed.[8]

The ethical consequences of screening children for the XYY genotype have the potential to be devastating to the child. Not only are the doctors and scientists labeling this child for life, but, it could be argued from a labeling perspective, that they are keeping him from leading a relatively crime-free existence. By labeling a child at such an early stage in his life, he is no longer free to be a normal, healthy child. His parents will always be waiting for something to happen. The level of anger, quite acceptable in a normal XY boy, may be treated with undue concern by fearful parents aware of the child's XYY genotype. This distortion could generate new behavioral problems and in a sense perpetuate a self-fulfilling prophecy.

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[6] Jon Beckwith and Jonathan King, "The XYY Syndrome: A Dangerous Myth", New Scientist, November, 1974, 474.

[7] Ibid, 475.

[8] Ibid, 476.

Along with the increased interest surrounding the study of the XYY genotype came many growing challenges. Many scientists, and criminologists alike, had severe doubts as to whether to pursue the directions the studies were taking. They did not feel a strong enough causal link had been established to even speculate that the XYY genotype made a man susceptible to a life of crime. They further argued that continued research would only harm more children than it helped. By 1975, faced with a growing public outcry over the ethical issues, scientists began to cease their research. Research on XYY males had simply become too hot to handle. And for the most part, it has remained so to this day. But with the abrupt end to XYY research, there remained many unanswered questions. The mystery remains unsolved. Hence, in the words of a 1979 medical review of the 47, XYY condition: "There is no characteristic that is uniformly present in patients with 47, XYY chromosome constitution other than the fact that they do have an extra Y chromosome."[9]

Lessons Learned from the XYY Experience

If there is a single overriding lesson to be learned from the XYY debate, this lesson must concern the incredible eagerness with which scientists and non-scientists alike have historically grasped at quick, socially convenient definitions of genetic disability or disease. Suzuki believes,

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[9] Marc Lappe, Genetic Politics, (New York: Simon and Schuster, 1979).

> Overwhelmed by the complexities that underlie human differences, we are often too quick to judge one another on the basis of fragmentary genetic clues. In our impatience for easy answers to difficult questions, we run the risk of investing readily detectable hereditary traits with almost mystical prophetic powers. Like some prescientific shamanistic healer who finds people's fortunes revealed in fallen strands of hair or the discarded clippings of their fingernails, we unconsciously begin to extrapolate from the qualities of the part the qualities of the entire organism.[10]

Regardless of which aspect of human genetic molecules we select for an early warning system for behavior, be it abnormalities in the sex chromosomes, or differences in DNA nucleotide sequences, we risk being deceived. Most geneticists agree that the vast majority of human behavioral attributes are polygenic and reflect the interaction between many genes. "Every element of our behavior is influenced, at every stage of its development, by a multitude of environmental factors too numerous to anticipate."[11]

The XYY controversy should further caution scientists and non-scientists in drawing conclusions from the results of the Human Genome Project. Every one of us is genetically flawed to some extent. Our genomes are likely to be laced with all sorts of errors, most of them, for one reason or another, masked yet fully capable of surfacing in a subsequent generation. None of us can hope to claim genetic perfection. In the face of an unpredictably changing environment, it is, after all, an absurd notion.

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10 Suzuki, 156.

11 Winfred Malone, Scientist at the Cancer Research Institute, Division of the National Institutes of Health, personal interview, 21 June 1995.

The XYY story may serve as a valuable example of what happens when people insist on simple answers to problems in human behavioral genetics and apply these answers in too great a haste. Because the XYY story is an unfinished one, it may also leave us with a personal dilemma. How are we suppose to act if an XYY genotype surfaces in our own lives? Should we be willing to welcome an unborn XYY child, however vague the suspected symptoms, into our own families? A compelling case may be made for declaring every genetically normal unborn male, equipped with a 46, XY genotype, at a significant statistical risk for many of the same sinister characteristics that have been dumped on the 47, XYY male. Why? Compared with their female, Y-less counterpart, men, throughout history and across all societies, have shown themselves to statistically be more prone to aggression, violence and crime.

Draft Chapter 4

Social and Policy Implications

Difficult as it is to create a monster,
it is even more difficult to control it or to restore order
after the creation has spawned chaos.
In seeking to control our world,
we may in fact lessen our control over it.
-George Annas

A constructive way to begin an analysis of ethical, legal and social issues in the Human Genome Project is to ask in what ways it is dissimilar to other scientific and technological movements. For one thing, contemporary genetics, of which the Human Genome Project is only one part, has been characterized by a rapid transition from basic research to practical applications. McKusick tells us for example,

> The polymerase chain reaction (PCR) can take DNA and use it to make virtually unlimited copies of itself; enough to enable forensic laboratories to do "DNA fingerprinting" and enough to allow embryologists to use the DNA in a single cell from a human blastocyst to determine the sex of and the presence or absence of many genetic diseases in the child that blastocyst might become.[1]

Such quickness allows little time to contemplate the ethical, legal and social issues that may result.

Furthermore, genetics is a science and technology of human differences. It emphasizes the ways in which individuals and groups differ from one another. In addition to emphasizing our differences,

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[1] Victor A. McKusick, "The Human Genome Project: Plans, Status and Application in Biology and Medicine", Gene Mapping: Using Law and Ethics as Guides, eds., George J. Annas and Sherman Elias, (New York: Oxford University Press, 1992), 32, 38.

genetics emphasizes the continuity between generations, between ancestors and descendants

The history of the past hundred years is replete with examples of the misuse of genetic ideas. An argument could be made that a major reason for that susceptibility is the convenient and reassuring way genetics can be used to explain and justify social differences among individuals and groups. Whether this is correct is less important than recognizing the recurring phenomenon.

One more feature that sets off genetics from most other scientific and technological endeavors is the fact that genetic correlations with characteristics of individuals have inescapable, but complex implications for judgments about personal responsibility. We are less inclined to assign credit or blame to persons when their achievement, or misbehavior, or illness is at least in part genetically determined.

By far, the most persistent criticisms of the Human Genome Project have been those directed against the potential use of the genetic knowledge once it is gained. In a project of such magnitude and intimacy, it is not surprising that ethical concerns have been raised. On the contrary, the benefits of this knowledge are likely to be enormous. For example, there will almost certainly be valuable medical spin-offs from a DNA sequencing project on the scale of the Human Genome Project. Gene sequencing is likely to lead to all sorts of new diagnostic tests that can be used to recognize genetic disorders at an early stage, identify asymptomatic carriers of defective genes and provide improved genetic counseling for individuals and families. Newly sequenced genes will also be cloned

in bacteria or yeast cells to churn out pure, genetically correct pharmaceutical products that may provide new treatments for certain hereditary illnesses.[2]

However, because this store of base sequences will represent an incredibly precise inventory of minute, often inconsequential hereditary differences between people, it will be highly vulnerable to abuse. It could be argued that much of the historical abuse of genetics comes from an exaggerated belief that "nature" is more important than "nurture" in the expression of human talents and disabilities. "Genetic" is interpreted to mean "inevitable", and the role of socialization, diet or some other aspect of the environment vital for genetic expression is ignored.

Furthermore, computerized human gene banks are likely to emerge and offer new opportunities for genetic screening programs for identifying individuals who possess genes considered "defective" or "inferior". With such a bounty of unexplored data on the human genome available, there may be temptation to place too great a causal role to many freshly mapped genes simply because of their preliminary statistical association with perplexing health problems. As in the past, some people are bound to exploit such findings by publicly proclaiming that they offer scientific solutions for fixing everything from alcoholism and mental illness to criminal behavior and learning disabilities. In the absence of other, more compelling evidence for links between specific DNA sequences and disease or

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[2] Winfred Malone, scientist at the Cancer Research Institute, Division of the National Institutes of Health, personal interview, 21 June 1995.

behavior, our swollen DNA banks could quickly become reservoirs for easy genetic answers to complex social problems.

The "Science" of Human Differences

In the past, one of the ways in which our society has expressed its preference for homogeneity and rationalized the exclusion of certain groups is by focusing on genetic explanations for perceived differences between groups. Although the concepts of race and ethnicity have no scientific or analytical meaning, they have been used historically to describe human differences. They are socially constructed concepts in which differences in the phenotypic characteristics of individuals are given prominence. Thus, "race and ethnicity in the biological sense have no biological consequences, but what people believe about race and ethnicity have very profound social consequences."[3]

The question of justice is central to any endeavor that tries to understand the social impact of vastly increased genetic information. Who will benefit and who will be burdened as a consequence of this new knowledge? "In a society like ours, composed of persons from many racial and ethnic groups and economic classes, the critical question is whether the knowledge gained from the Human Genome Project will be used in a way that will benefit all."[4] In the course of mapping and sequencing the human genome, additional correlations

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[3] D.R.Atkinson, G. Morten and D.W.Sue, Counseling American Minorities: A Cross-Cultural Perspective, (Dubuque, IA: Wm.C.Brown Publishers, 1989), 4.

[4] R.A.Shweder, "Dangerous Thoughts", (book review of C.N. Degler, In Search of Human Nature: The Decline and Revival of Darwinism in American Social Thought, New York: Oxford University Press), New York Times Book Review, March 17, 1991, p1.

between genetic characteristics and racial and ethnic status are likely to emerge. Genetic information historically has been used to reinforce negative stereotypes about racial and ethnic groups and the poor, rather than to deemphasize differences among groups in the United States. The eugenics movement in the United States in the early part of this century is an excellent example of this phenomenon.

It would be tragic and unjust if the gene mapping endeavor resulted in benefiting only a few, and at the same time, exacerbating existing disparities between groups in our population. With the increasing accumulation of genetic information, people are likely to experience a great over-enthusiasm for genetic explanations for human differences.

> Human genetics is the example par excellence of a science of human difference. It will provide a virtually endless stream of reasons regarding others as different, for not treating people as equals. How society deals with the evidence of genetic individual and group differences will be vitally important in the political future and, above all, the moral and legal future.[5]

It is important that we learn from the mistakes we made in the past because current and future gene mapping efforts may adversely affect the poor and minority groups in at least two ways. First,

> the genetic information produced will be complex and difficult to interpret. As a result, it will be highly amenable to misinterpretation and abuse. It could be used to legitimate existing racial and class disparities on the grounds that race and class are linked to genetically based characteristics. In other words, we risk increasing social intolerance for

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[5] Thomas H. Murray and Efrat Livny, "The Human Genome Project: ethical and social implications", Bulletin Medical Library Association, 83 (1) Jan, 1995, 20.

> differences among human beings, as well as creating what Dorothy Nelkin and Lawrence Tancredi have called a 'biological underclass'. Second, the promise of medical benefit may not be achieved. Medical institutions that direct the distribution of benefits that potentially will flow from gene mapping efforts may not be established in ways that maximize potential benefit for minorities or the poor.[6]

It could be argued that perhaps the greatest danger to racial and ethnic minorities and the poor from the current gene mapping efforts is that greater attention will be paid to genetic explanations rather than to more complex explanations for differences, much to the detriment of these vulnerable and disadvantaged groups.

Critics worry that science is being used as a proxy for deeply held social values: that woman cannot compete, that blacks are inferior, that war or crime or homosexuality or poverty are a disease that must be combated by medical means. Critics point out that there is little evidence that terrorism, or sexual preference, or personality traits such as shyness or bullying are genetically anchored, and that it is easy to mistake the intransigence of human cultural qualities (aggression or rape, for example) for biological anchoring.

In discussing the possibility of discrimination based on genotype, Dr. Arthur Caplan, director of the Center for Biomedical Ethics at the University of Minnesota, Minneapolis, said, "If you have a society that leans toward an alertness of racial and ethnic differences, the Human Genome Project provides every opportunity for them to take this up to a high science." On the other hand, "The

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6 Patricia A. King, "The Past as Prologue: Race, Class and Gene Discrimination", Gene Mapping: Using Law and Ethics as Guides, eds., George Annas and Sherman Elias, (New York: Oxford University Press, 1992), 100.

project may find that human are much more like each other than different."[7] In either case, society's view of what is "normal" will be affected.

Biological Determinism and Reductionism

Biological Determinism, as we have already learned, is the view that the large part of human talents and disabilities- perhaps even our likes and dislikes- are anchored in our biology. The Human Genome Project has already been criticized by groups who fear the central rationale for the project is a biological deterministic one. James Watson, former head of the project, did little to dispel this concern when he said, "the project provides the ultimate tool for understanding ourselves at the molecular level. We used to think our fate was in the stars. Now we know, in large measure, our fate is in our genes."[8] Others claimed that "in knowing the complete human genome, we will know what it is to be human."[9]

Evelyn Shuster points out,

> A perception that human genetics is essentially deterministic and reductionist could lead to the misapplication of genetic information and foster socially dangerous ideologies. Just as the Nazi physicians enthusiastically misused genetics to promote and implement their racial hygiene program in the

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[7] Jody W. Zylke, "Examining Life's (Genomic) Code Means Reexamining Society's Long-Held Codes", JAMA, 267 (13), 1715.

[8] George J. Annas, "Impact of Gene Maps on Law and Society", Trial, July, 1990, 27.

[9] Evelyne Shuster, "Determinism and Reductionism: A Greater Threat because of the Human Genome Project?" Gene Mapping: Using Law and Ethics as Guides, eds., George Annas and Shermann Elias, (New York: Oxford University Press, 1992), 115.

1930's and 1940's, so too could others misuse the fruits of the Human Genome Project.[10]

Another of the possible dangers of biological determinism is that the root cause for the onset of a disease (cancer, for example) is shifted from the environment (toxic exposures) to the individual (genetic defects). The scientific search shifts from a search for mutagens in the environment to biological defects in the individual. "The risk is what might be called an ideological one; if the (mis)conception grows that 'nature' is more important than 'nurture' in the onset of certain diseases, lawmakers may find themselves less willing to enact strong pollution measures or consumer protection legislation."[11]

Furthermore, it seems that biology has been blamed for nearly every conceivable vice and folly of human life, and is often a common and convenient explanation for intractable social problems. In 1979, amid growing fears of international terrorism, *Science* magazine reported research claiming that "most terrorists probably suffer from faulty vestibular functions in the middle ear."[12] In 1989, with violence growing in the schools, physician Melvin Konner wrote in the *New York Times Magazine* that the tendency for people to do physical harm to others was "intrinsically fundamental, natural."[13]

Suppose, in the process of mapping and sequencing the human genome, a "criminal gene" was discovered. What would we do with

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[10] Ibid, 116.

[11] Robert N. Proctor, "Genomics and Eugenics: How Fair is the Comparison?", Gene Mapping: Using Law and Ethics as Guides, eds., George Annas and Sherman Elias, (New York: Oxford University Press, 1992), 80.

[12] C.Holden, cited in Proctor, 83.

[13] M.Konner, "The Aggressors", New York Times Magazine, August 14, 1988, 33.

this information, and how would it effect the criminal justice system as we know it? The presupposition that the Human Genome Project may uncover evidence of traits such as a "criminal gene" is of great concern for sociologists. Looking to genes as the solution to social problems takes attention away from other social and environmental factors that need to be addressed.

The Human Genome Project has been described by its proponents as the ultimate tool in uncoding all that it is to be human. James Watson characterized the Human Genome Project as the search for "ultimate answers to the chemical underpinnings of human existence.[14] Evelyne Shuster notes,

> These hyperbolic statements support a view that genetic knowledge is the ultimate in determinism and hereditarianism. The conceit is that once the structure and function of the genome is understood, once the concepts of genetic code, program, and messages are grasped, it may seem possible to have a gene-based explanation of all phenotypic characteristics, including all aspects of health, disease and even behavior. It has been suggested by the editor of *Science* that the knowledge gained from the Human Genome Project could solve the problems of homelessness and crime.[15]

The question of whether one is product of his or her genes or environment has been debated for decades. Edwin Sutherland states within his "Theory of Differential Association" that criminal behavior is learned and not by any means inherited.[16] However, Daniel Koshland, the editor of *Science* magazine, asserted in 1987 that "in the warfare between nature and nurture, nature has clearly won,

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[14] Shuster, 115.

[15] Ibid, 115.

[16] Edwin Sutherland, On Analyzing Crime, (Chicago: University of Chicago Press, 1992), 8.

with all that implies for the idea of genetic determinism and immutability of inherited traits."[17]

Because of the apparent certainty of genetic tests, they are credible and thus likely to be taken as fact. The problem with this is that it is ignorant to believe one's environment has nothing to do with the way in which one behaves. Dorothy Nelkin argues,

> Tests can be used to redefine socially derived syndromes as problems of the individual, placing blame in ways that reduce public accountability and protect routine institutional practices. The availability of biological tests, in effect, gives an organization a scientific means to deal with failures or unusual problems without threatening its basic values or disrupting its existing programs.[18]

Thus, individuals, not the social environment, will be held fully responsible for their disadvantages, and thus be labeled. Labeling is an example of a misuse of this genetic information. Evelyne Shuster concurs,

> A misuse of genetic information could justify the destruction of all embryos less than "perfect", the de facto creation of a new "biological underclass" and the systematic ostracism of the "genetically unfit". Society could have a powerful genetic tool for controlling individuals through an entire series of labeling and intervention: a "bio-politics of the population".[19]

Howard Becker studied the idea of labeling very closely. Within his Labeling Theory Becker states that one's deviant or criminal behavior is a result of having been labeled deviant. He states,

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[17] Dorothy Nelkin, "The Social Power of Genetic Information", The Code of Codes, eds., Daniel Kevles and Leroy Hood. (Cambridge, MA: Harvard University Press, 1988), 182.
[18] Ibid, 183.
[19] Shuster, 116.

> . . . social groups create deviance by making the rules whose infraction constitutes deviance, and by applying those rules to particular people and labeling them as outsiders. From this point of view, deviance is not a quality of the act the person commits, but rather a consequence of the application by others of rules and sanctions to an "offender". The deviant is one to whom that label has been successfully been applied; deviant behavior is behavior that people so label.[20]

It is possible that the Human Genome Project may open new doors of evidence for those wishing to prove once and for all that criminality is, in fact, inherent within humans as individuals.

If it ever was to become possible to correlate specific behaviors with specific genetic differences, it would not be hard to imagine the use of this argument to justify the conduct of an individual being tried for a crime. Should scientists then attempt to predict future criminal behavior using genetic evidence? Should society consider excusing criminal responsibility following genetic analysis by the development of a new category of criminal culpability-- not guilty by reason of heredity? Will the time come when an abnormal nucleotide sequence is a sufficient defense against murder? Will inclusion of a person in a criminal "risk group", based on genetic characteristics, be adequate as probable cause to justify police surveillance? Will every part of our conscious existence, from our political views to our musical taste, be proven to be based in the depths of our chromosomes?

There are no ready responses to questions like these, but society must be made aware of the potential for abuse that will come with this new genetic information. Over the next ten years, as a

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[20] Howard Becker, Outsiders, (New York: The Free Press, 1963), 9.

consequence of advancement in biological knowledge, we will arrive at new understandings. We will come to understand how we are assembled, dictated by our genetic information. But society will have to wrestle with the question of how much is dictated by the environment, how much is dictated by our genes, and how much is dictated by our own will and determination.

What Is Normal Anyway?

The complete DNA sequence of the human genome is intrinsically interesting to us as a species. But we would be deluding ourselves if we thought that by possessing it we could grasp the full meaning of human inheritance, indeed, of our very humanness. The lives of genes are dazzlingly complex dances involving the simultaneous interactions of countless genes, enzymes, metabolic processes and environmental factors. Thus, it would be simplistic to claim that a gene's multidimensional dance could be fully choreographed by a one-dimensional base pair however vital that text is to the outcome of the performance.

Murray and Livney tell us,

> the notion that human genome research is beneficial is based on the assumption that the more scientists and doctors know about the genetic roots of healthy, normal human beings, the better they can predict, treat and correct deviations. But several questions immediately arise: How and by whom are normal and healthy states determined? How and by whom are deviations diagnosed, classified and judged? What decisions and actions can and should be taken in response to such diagnoses? Who makes these decisions?[21]

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21 Murray, 14-15.

It is perhaps inevitable that the appeal to the desire for health translates into a search for unhealth. Hence, standards of normality can only be specified in this endeavor through negation, that is, by the absence of those alleles[22] said to cause disease.

Even more problematic, however, is the insistent ambiguity in the term *normal*, an ambiguity that philosopher and historian of science Ian Hacking traces to August Comte:

> Comte . . . expressed and to some estent invented a fundamental tension in the idea of the normal- the normal as existing average, and the normal as figure of perfection to which we may progress. This is an even richer source of hidden power than the fact/value ambiguity that had always been present in the idea of the normal . . . On the one hand there is the thought that the normal is what is right, so that talk of the normal is a splendid way of preserving or returning to the status quo . . . On the other hand is the idea that the normal is only average, and so is something to be improved upon.[23]

This ambiguity allows all of us a certain latitude in our expectations of normalcy. However, we must be cautious of our own complacency that there are some "right hands" in which to place the responsibility for defining normality.

In addition, Human Genome Project proponents are often accused of ignoring a new frontier in genetics involving a phenomenon called "jumping genes". Barbara McClintock showed through the study of corn, and later bacteria, that the genome is not carved in stone, but is a living thing constantly adapting to the

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[22] Alleles can be simply defined as the expression of a gene. For example, the gene for eye color has two alleles- pigment (brown-dominant) and non-pigment (blue-recessive).

[23] Ian Hacking, The Taming of Chance, (Cambridge: Cambridge University Press, 1990), 168.

environment of the organism. An individual's genome is different today from what it was last week. Therefore, a "normal" genome does not exist.[24] Evelyn Shuster concurs when she states,

> humans, like any other organisms, have been genetically programmed. But they have been programmed to learn. A variety of possibilities have been offered to them by nature at birth. However, that which is realized is being constructed during lifetime. This indicates that a genetic program is not fixed and predetermined.[25]

Barbara McClintock further contends, "A genome may reorganize itself when faced with a difficulty for which it is unprepared . . . the types of response are not predictable."[26]

Genes are seen as a necessary component of some diseases but the mechanism through which genes are expressed is highly unpredictable and is heavily influenced by the environment.[27] R.C. Lewontin, for example, says genes are incapable of doing anything by themselves. Genes only provide the blueprint for proteins that are created in a complex machine called the cell. This process is open to errors in metabolism and these cells are also influenced by the environment. Development depends upon both what we have inherited from our parents as well as temperature, nutrition, sights and sounds (including education) and other conditions that surround us.[28]

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24 William S. Klug and Michael R. Cummings, Concepts of Genetics, (New York: Macmillam College Publishing Co., 1994), 367-8.
25 Shuster, 122.
26 Ibid, 122.
27 Malone.
28 R.C.Lewontin, "Biological Determinism as a Social Weapon", Ann Arbor for the People, (Minneapolis: Burgess Press, 1977).

The assumption that some deviations from normal behavior may be influenced genetically leads to another set of serious dilemmas. As stated by Carol Tauer, "the Human Genome Project carries a dramatic metaphor: the notion that our genes are the program that determines who we are and that when we know all the genes, we will know the human being, both genetically and individually."[29] If, in fact, humans are their genes, then how can they be held morally and legally responsible for their tendencies, choices and acts? Above all, will this new knowledge provide the ultimate yardstick by which to measure the nature, meaning and value of human life? According to Crowther, "when the future of human genetics is so cool and logical, the temptation is to think of our humanity as nothing more than a biological computer program. Here, surely, is the ultimate in the humbling of Man. Our moral worth is nothing more than the richness and complexity of our program."[30]

Finally, it is important to understand that each of us is genetically imperfect. It is estimated that each of us carries five or six heterozygous genes[31] in which the recessive allele (a) is lethal. Had we inherited two lethal, recessive alleles (aa) of this gene, the results would have been deadly. Many commentators have worried

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29 Carol Tauer, "The Human Significance of the Genome Project", Midwest Medical Ethics, summer 1992, 81 (1), 3.

30 Damian Crowther, "Perilous Knowledge: book review", Journal of Medical Ethics, 20: June 1994, 125.

31 *Heterozygous* is an individual with different alleles at one or more loci. Such individuals will produce unlike gametes and therefore will not breed true (i.e. Aa). *Homozygous* is an individual with identical alleles at one or more loci. Such individuals will produce identical gametes and will therefore breed true (i.e. AA or aa).

that inventorying our genomes for defects, mistakes or abnormalities may make us feel more fragile and vulnerable; it may make us all think of ourselves as sick. What does it mean to have an "abnormal" genome? Related to concepts of health and disease are concepts of reductionism and determinism. We know that we are more than the sum of our genes, but a concentration on our genetic composition may make us think of ourselves primarily as a composite of genes and lead us to marginalize the contribution of environment. The 47,XYY experience has also taught us that a genetic explanation for behavior can be both powerful and misleading.

In any case, society's view of what is normal will be affected. George J. Annas, professor of health law at Boston University, has written: "Powerful technologies do not just change what human beings can do, they change the very way we think- especially about ourselves."[32]

I think that it is clear that we won't discover a "normal" or "standard" human genome, but we may invent one. If we do, how much variation from the norm will society permit before an individual's genome is labeled "substandard" or "abnormal"? And what impact will such a concept have on society and on "substandard" individuals?

Science and Technology

Given the extraordinary accomplishments of twentieth century science, it is not surprising that Americans tend to respond to such

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[32] George J. Annas, Hastings Center Report, 1989, 19: 20.

issues as the Human Genome Project by substituting a blind faith in scientific progress and in scientific ways of knowing for individual moral responsibility. But that faith is misplaced unless we recognize that science offers a very limited view of the world. In the first place, the fruits of scientific inquiry are not necessarily facts. They are, at best, tentative truths subject to continuous criticism, modification and rejection by other researchers.

Secondly, scientific explanations tend to be fragmentary. That is, they tend to explain only one part of the greater whole. By sacrificing the whole for the part, scientists are able to get an understanding for isolated areas of natural systems and gain control over some of its processes.[33] But these successes can blind us to the fact that biology seldom has much to say about the future consequences of these applications on societies and ecosystems. We need to look no further than the long-term effects of the automobile, nuclear fission or agricultural pesticides to appreciate the myopia of science. The effects of each of these applications of science extend far beyond their intended use.

In many ways, the accelerating pace of scientific and technological advances has thrown us out of balance with the natural world. Technology has equipped our species with the mechanical equivalent of muscle power that now greatly exceeds that of any species ever to have lived. It has provided us with the resources to enable us to become the largest, most far-flung population of large mammals on earth. A whole host of human activities, from

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[33] adapted from Earl Babbie, The Practice of Social Research, (Belmont, CA: Wadsworth Publishing Co, 1989), prologue and introduction to Chapter 1.

commercial farming and forestry to the combustion of oil and coal, have altered the face of the planet. The tragedy is that in the process most of us have lost any clear sense of our species' place in global ecosystems and of our biological kinship with other living things. We must not lose sight of this larger context as we continue to tinker with genes and shape the hereditary futures of species. For as we embark on this new era of applied molecular genetics, we are in some ways incredibly shortsighted. We are so intent on rushing to exploit our newly acquired insights that we often do not have the faintest idea of the long-term consequences of our technologies.

> History suggests that in the wake of dramatic scientific conquests- such as the testing of the first atomic bomb in Alamogordo, New Mexico; the first United States lunar landings; and the building of the first commercial nuclear power plants- we have often congratulated ourselves prematurely on our newfound 'mastery' over the forces of nature.[34]

In much the same way, the successful completion of a massive, goal-oriented, human DNA sequencing program could give us a false sense of scientific mastery over our species' genome.

Conclusions

"There is the belief that problems of criminality, behavior deviation, individual capability, even differences between sex, race and general intelligence (IQ) can be accounted for solely from within

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[34] David Suzuki and Peter Knudtson, Genethics: The Clash Between the New Genetics and Human Values, (Cambridge: Harvard University Press, 1989), 337.

the domain of human genetics."[35] Ultimately, perception is all that matters. If it cannot be persuasively dispelled, the applicability of genetic information in predictive and curative medicine and in practical human affairs will be problematic at best and could be dangerously attractive and destructive of cultural and moral interests. It should be obvious that the attainment of a complete map and sequence of the human genome will not provide a solution to human problems. Nor will it explain what makes humans uniquely human.

The Human Genome Project will inevitably confront some of our basic values and beliefs in many ways: our acceptance of our imperfections and mortality; our compassion; our willingness to accept responsibility for our actions; our commitment to justice. No single institution can assure that we will make the right choices when these values are at stake or even that we will recognize when they are at risk. Thus, scientists have a responsibility to inform other sectors of the community of their advances and new dilemmas. ELSI, the acronym for Ethical, Legal and Social Implications related to mapping and sequencing the human genome, was created by the Department of Energy and The National Institutes of Health to address these and many other issues related to genome research.

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35 Lewontin

Draft Chapter 5

Conclusions

Upon its completion, the fifteen year, three billion dollar international Human Genome Project will have expanded genetic knowledge dramatically. This great investment of time and money for the vast accumulation of genetic data is justified on the grounds that all humankind will ultimately benefit. However, progress made on the research front is coupled with an ever intensifying public debate over the promises and the threats this new knowledge holds for society and individuals.

This genetic information will tell us whether we are likely to die young of an untreatable disease. It will reveal predispositions to certain mental illnesses. It may tell us our personal endowments of traits that make up what we now grossly call intelligence, perhaps sparking calls for educational tracking at an early age. It will tell us what the future holds for a prospective spouse and hundreds of characteristics of an unborn child. Pregnancy could become a hideous lottery of deciding whether to hang on to a particular set of genes or hope that a subsequent fetus might be an improvement. Without proper safeguards in place, this information may come without the knowledge to understand its consequences for us, individually or collectively, and without the means- new institutions, laws and regulations- to use it wisely or even safely.

The near term ethical challenges of the Human Genome Project lie in the essence of what the project will produce in abundance: genetic information. A 1989 editorial in *Trends in Biotechnology*

contends, "'human improvement' is a fact of life because of consumer demand. How can we expect to deal responsibly with human genetic information in such a culture?"[1] Other challenges center on control, diffusion and use of that information within the context of the market economy. We should keep in mind that the potential for abuse of any technology is largely dependent on the social context within which that technology is used. "The danger is that in a society where power is still unequally distributed between the "haves" and "have nots", the application of the new genetic technologies, as of any other, is as likely to reinforce as to ameliorate patterns of indignity and injustice."[2]

It is essential to focus on the genuine social, ethical and policy issues that the Human Genome Project raises, and to respond to them by creating codes of law and/or regulation for the use of human genetics information by geneticists, the media, insurers, employers and the government itself. Those who are charged with considering ethical, legal and social implications of gene mapping must, at a minimum, take account of the social and policy implications of differences among human beings in trying to achieve a favorable balance of risk to benefit in policy decisions about the use of new genetic information. As an integral part of that balance, they must seek to ensure that benefits, should they materialize, are fairly distributed to all. If the social, ethical and legal questions

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[1] John Hodgson, "Editorial: Geneticism and Freedom of Choice", Trends in Biotechnology, September, 1989, 221.

[2] Robert N. Proctor, "Genomics and Eugenics: How Fair is the Comparison?", Gene Mapping: Using Law and Ethics as Guides, eds., George J. Annas and Sherman Elias, (New York: Oxford University Press, 1992), 84.

surrounding genetics are not adequately addressed, the nation's medical and scientific communities are in danger of making the same mistakes that clouded the history of screening for sickle cell anemia.[3]

Furthermore, it has been suggested that genetic determinism is inappropriately used as a biological rationale to justify and maintain societal institutions. The view that genes make individuals and individuals make society can be stretched to serve as the explanation for social evils. Thus, genes, not inequalities of opportunity, determine why some societies are rich and some are poor, why some minorities are not well represented in some occupations and why one nation dominates another.

It could be argued that by believing we, as humans, are essentially "slaves" to our genes, we encourage the belief that drug abuse, criminality and other socially unacceptable behaviors can be fixed genetically, and that social causes need not be addressed.

Harvard professor, Ruth Hubbard concurs when she says, "Looking to genes as the solution to social ills promises quick fixes and takes attention away from poverty, pollution and other factors that need to be addressed politically."[4]

Thomas Murray and Efrat Livny contend,

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[3] Just two years after news circulated in 1970 that sickle cell anemia resulted in sudden death during exercise, many states enacted mandatory screening laws. The conclusion was wrong and the laws were soon abolished, but it resulted in employment and insurance discrimination as well as psychological distress for African-Americans who were stigmatized for carrying the sickle cell gene- from Patricia King, "The Past as Prologue: Race, Class and Gene Discrimination", Gene Mapping: Using Law and Ethics as Guides, eds. George Annas and Sherman Elias, (New York: Oxford University Press, 1992)98-9.

[4] Erik Lindala, "Renewed Debate Surfaces around Human Genome Project", Alternatives, 20(4), 1994, 13.

> individual futures are not dictated by genes. Nor is the future of society determined by some inexorable machine of genome science. Society has recognized that the new science of human genetics has profound implications for how humans shall live. And society has accepted the initial challenge by addressing the ethical, legal, and social issues posed by genetics. The next few decades will reveal whether society is up to the greater challenge of preserving what is best about individuals, institutions, and culture while integrating modern genetics into human lives.[5]

The increasing availability of human genetic information challenges individuals with wrenching decisions. Purely for personal reasons, people may not wish to obtain their genetic profiles, particularly if they are at risk for an inheritable disease for which there is no known treatment or cure. The problems and opportunities of individual choice aside, the torrent of new human genetic information will undoubtedly pose challenges to systems and values of social decency.

Furthermore, to speak in terms of eliminating genetic defects is to tread on slippery scientific and ethical ground. As any biologist will testify, genetic variety is the spice of life and a necessary ingredient to the survival of the species. Even to label genes as defective can be dangerous. In the nineteenth century new discoveries about heredity and evolution gave rise to the Eugenics movement- a misguided "science" whose followers felt that undesirable traits should be systematically purged from the gene pool. Believers ranged from the American eugenicists of the early

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[5] Thomas H. Murray and Efrat Livney, "The Human Genome Project: ethical and social implications", Bulletin Medical Library Association, 83(1), January, 1995, 20-1.

1900's, who thought humans should be bred like racehorses, to the German geneticists who gave scientific advice to the leaders of the Third Reich, instructing them on how the species might be "purified" by selective breeding and by exterminating whole races at a time.

Hence, if there is a disconcerting continuity between the old eugenics and this new genetics, it is the fact that both have taken root in a climate where many people believe that the large part of human talents and disabilities are heritable through the genes. Genes have become a near universal scapegoat for all that ails the human species. Furthermore, it is dangerous to assume that biology is destiny. Sequencing the human genome may be a technological marvel, but it will not give us the key to life. The genome is not "the very essence" of what it means to be human, any more than sheet music is the very essence of a concert performance.

With all of this new, vast, genetic knowledge, what should be done to guide policy-makers in choosing the directions that should be traveled in our genetic future? First, and most importantly, good public education and good scholarly analysis, especially for public and health care professionals, on the social policy issues and options raised by the Human Genome Project is essential. Second, guidelines must be implemented for when and how new genetic screening tests are introduced into medical practice and how the confidentiality and privacy of an individual's genetic information can be preserved. Third, in order to prevent the products of the Human Genome Project from becoming another mechanism for discrimination, employers and insurers should have strict guidelines pertaining to the use of genetic information in regards to their employees or clients. Fourth,

the government should consider blocking patents on parts of the human genome because it threatens to end current international cooperation in genetics research. Last, but certainly not least, there should be an international ban on biologically-based weapons and defense systems.

Social policy development is an integral part of modern science, and, if done properly, could act as a key promoter for scientific development. But it will take more than good intentions and adequate funding: both scientists and the public must get involved in open and intense discussions if the issues of human rights and human dignity are to survive the genetic revolution.

All of this said, one thing remains certain: the genie cannot be put back into the bottle. Like atomic energy, genetic engineering is an irresistible force that will not be wished or legislated away. The task ahead of us is to channel that force into directions that save lives but preserve humanity's rich genetic heritage. We can only hope that the traits that make us most human, such as character, will have a genetic underpinning far too complex to assign to a chromosome. And so far, noone is talking about mapping the soul.

Epilogue: Is the Past Prologue?

History does indeed seem to be repeating itself in the realm of a newer, more technologically advanced form of biological determinism. The Human Genome Project, with all that it implies for society in the future, sets off the same warning bells that have been sounded throughout history. Can we reduce human behavior and expression to biological functions?

Biological and genetic theories of human behavior have been proposed and discarded, only to resurface again and again throughout history. It could be argued that the reason for this constant resurgence of biological theories of human behavior is that by believing a person's biology is responsible for all that he or she does, we absolve society from having to take the blame. It may be that theories of biological determinism and reductionism offer a convenient rationalization for the failure of preventive efforts and an escape from the implications that criminal behavior is the result of our social organizations.

The Human Genome Project's goal to understand human beings at a molecular level reduces us to the mere parts that make up the whole. This is the basic premise that lies behind theories of biological determinism and reductionism. If, perhaps, scientists were to be able to link behavior with genes, how will society deal with issues such as crime and delinquency? The issue of how biological determinism overshadows the Human Genome Project is of great concern to those associated with ELSI, and prompts one to ask, "Is the past prologue to the future?"

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Appendix

(Sample of letters sent to ELSI participants)

Mrs. Dawn Breen
506 Buffalo Street
Farmville, VA 23901

Dorothy Nelkin
Department of Sociology
New York University
Mercer Street, 4th Floor
New York, NY 10003

Dear Ms. Nelkin:

Hello. I am a second year graduate student at Longwood College in Farmville, VA working towards a Masters degree in Sociology. I am currently working on my thesis research, scheduled to be completed by November 1st, and was hoping that you could help me out. The topic I have chosen for in-depth study is the social and ethical implications of the Human Genome Project. (A perfect subject for a sociologist.) More specifically, I am interested in looking at the implications of genetic reductionism and genetic determinism, (where individual's actions are judged more in terms of their supposed accord with their chromosomal make-up than in any social or environmental terms), and how they relate to the Human Genome Project. It is my belief that the Human Genome Project is simply a more advanced, more technological form of "biological determinism", and great care need to be taken in interpreting the information the Human Genome Project produces.

Your name and address was given to me by Joseph D. McInerney, Director of Biological Sciences Curriculum Study. He suggested that I contact you in the hopes that you may be able to send me some further information on the topic, or where an appropriate source could be obtained. I would greatly appreciate any help that you could give me.

Sincerely,

Dawn Breen