

common trait would require as many as 8000 new subjects. This would mean enrolling 781 new families just to confirm a result that has already been published. Few granting agencies are willing to finance such a study because the result of the study is already known. Yet the very nature of science requires that a finding or a result be replicated before it can be believed. It is just too easy for a well-meaning and dedicated scientist to make a mistake, and there are some scientists who are neither well-meaning nor dedicated. To accept an important result at face value, without verifying it, is sheer foolishness. Yet the budget constraints that science now operates under mean that many important results may never be replicated until too late.

Underestimating the Environment

This list of caveats is not meant to imply that split twin studies are invariably weak or that molecular genetics studies are inherently stronger. Split twin studies, when properly done, are an astonishing window into the workings of the human genetic program and how that program interacts with and is influenced by the environment. It is quite likely that split twin studies will remain as one of the two principal ways to attack the problem of nature versus nurture, with molecular genetics being the other approach. The caveats here are simply meant to illustrate the difficulty of doing science properly. And certainly molecular genetics has problems of its own, which will be examined in greater depth later (Chapter 5).

The truth of the matter is that genetics simply cannot explain all of human behavior. The most recent information suggests that roughly half of all that makes us human is inherited from our parents. This of course means that roughly half the range of behaviors we see around us are the result of the environment acting on the individual. Without a doubt, the environment and the genes interact in subtle and marvelous ways that have not yet been deciphered. But there is very grave danger in accepting that all behavior is genetic.

The Dark History of Eugenics

A large part of the reason why the subject of nature and nurture is so laden with emotion for so many people is that the new science of behavioral genetics has intellectual roots in the old ideas of eugenics. Eugenics is that field of study dealing with improving the inborn qualities of the human race, particularly through the control of hereditary factors. The emotional resonance of the nature versus nurture controversy cannot be fully appreciated without an understanding of the dark history of eugenics. No one should forget that the ideas touched on here are explosive; problems in human biology are fascinating, but they are also emotionally charged. It is simply impossible to study our own species as dispassionately as we would study an insect or a bird. Social values are inherent, or potentially so, in any scientific finding about humans, and the scientist who is unaware of this is naive and open to exploitation.

Eugenics originated as a scientific movement, validated by the leading scientists of the time. To call eugenics a "pseudoscience" is to make it seem less threatening, but it is also incorrect; the great majority of scientists at the turn of the century believed in eugenics. In 1916, all five scientists who founded the American journal *Genetics* were advocates of eugenics, even though each was an established scientist of great reputation.¹² If most practicing scientists adhere to a certain view of the world, that viewpoint is, by definition, mainstream science.

Although eugenics began as a scientific concern for the betterment of the human race, it evolved into a social and

political effort to control human evolution. The ideas of eugenics were gradually perverted into ideals, against which all persons could be measured. Ultimately, millions of people were systematically killed by the Nazis because they did not fit the rigidly codified ideals of the day. The fact that mainstream science was used as a rationale for systematic genocide is proof that ideas can have great power. It is also proof that scientists who have ideas of great power may be unable to foresee the consequences of those ideas.

The word *eugenics* was coined in 1883 by Francis Galton, who, as mentioned earlier, first achieved prominence studying the heritability of genius. The word is derived from Greek words meaning "wellborn" and it refers to the application of scientific principles to improve the human stock, by ensuring the production of healthy offspring. A eugenic program is thus a public policy designed to increase the frequency of some desired trait in a population. A eugenic program can involve positive eugenics, or a systematic effort to maximize the transmission, from one generation to the next, of traits that are considered desirable. But a eugenic program can also involve negative eugenics, or a systematic effort to minimize the passage of traits considered undesirable. It seems to be a relatively small intellectual step from a program of negative eugenics to one of genocide, or the systematic extermination of persons who possess traits considered undesirable.

The Early History of Eugenics

The intellectual roots of eugenics extend all the way back to Plato, who believed that defective children should not be cared for by parents. He also believed that chronic invalids and those who were ill because of self-indulgence should not receive medical care, and that moral degenerates should be executed. Plato even advocated temporary unions between superior men and women for the express purpose of having superior children.

The rationale for a eugenics program was clarified in 1798, when Thomas Malthus proposed that the human population was expanding faster than was the food supply. His *Essay on the Principle of Population* was the first to note that the earth's resources are limited, and that starvation awaits a population that outgrows its resources. Malthus believed that increases in population would always outstrip increases in food production, and that rampant population growth would eventually be checked by competition between human beings for the simple necessities of life. This essay is often credited as the first substantive contribution to the study of ecology, but it is also arguably the first major contribution to both evolution and eugenics. Darwin was strongly influenced by Malthus, and Malthusian ideas of resource limitation are a clear precedent to the idea of natural selection. When Charles Darwin published his *Origin of Species* in 1859, all the intellectual tools were then in hand for the development of eugenics.

Francis Galton was convinced, as long ago as 1861, that a wide range of human physical, mental, and moral traits are inherited.¹³ Galton had read *Origin of Species*, written by his cousin Darwin, and it made a great impression on him. Galton reasoned that continued progress or evolution of humans depended on transmitting the best human traits to future generations. In 1865, Galton proposed that human society could be improved through "better breeding" in an article entitled "Hereditary talent and character." But Galton's ideas on eugenics caught on slowly because, at that time, there was no understanding of genetics, or the mode of transmission of traits from one generation to the next. Mendel's now famous experiments on the breeding of pea plants had already been done and forgotten, and Western science had not yet rediscovered Mendel's laws of inheritance. But, in 1883, Galton published his book *Inquiries into Human Faculty*, in which he first used the word *eugenics* and described in detail his ideas for improving the human race by controlled breeding. This time his ideas fell on fertile ground, and the Galton Laboratory was soon founded at University College, London.

Soon after Galton wrote his treatise on the heritability of genius, another highly influential book was published, this one on the heritability of criminality. *The Jukes: A Study in Crime, Pauperism, Disease, and Heredity* was about a family who came to the attention of the New York State judicial system because six members of the family were in prison in just one county. The book, published in 1877, included a detailed genealogy of the Jukes family, covering seven generations and including 750 different members of the family.¹ The author contended that the Jukes were an example of an inferior bloodline, one that was essentially doomed to poverty, vice, and crime, and that this family had already cost the state of New York well over \$1.5 million.

Eugenics in Germany

Mendel's work with pea plants was rediscovered in Germany at the turn of the century, and it inspired a tremendous flurry of scientific research in genetics. Germany quickly became the European center of activity in genetics, and it also became the center of activity in eugenics. Mendel's laws of inheritance were soon invoked to explain many different familial patterns of inheritance, including the inheritance of mental illness, retardation, alcoholism, criminality, prostitution, and poverty.

Around the turn of the century in Germany, a wide general interest in "racial purity" was stimulated by two things: social unrest caused by rapid industrialization and concern about the societal implications of Darwin's theory.¹³ It was generally believed that elite segments of the German population were producing too few children in comparison with the working classes. The various wars that Germany had been in were seen as counterproductive, since the most able men were sent off to die, while those who had been rejected for military service stayed home and were free to procreate. The German physician Wilhelm Schallmeyer proposed in 1892 that each citizen be given an annual examination by a physician trained in the science of

heredity. The latter was to be a state official and each German would be issued a health passport. Another young physician, Alfred Ploetz, returned to Germany from the United States in 1895, to publish a book on "racial hygiene." Schallmeyer and Ploetz were quickly acknowledged as the intellectual leaders of the eugenics movement in Germany.

Perhaps originally, the eugenics movement in Germany was concerned with the betterment of the German nation as a whole, but this was quickly perverted into concerns for the betterment of "Aryans" alone. Aryans were rigidly defined as those non-Jews who could document their German origins for many generations back. National fitness was linked to "racial fitness," and the supposed inferiority of Jews, Eastern Europeans, and blacks became a constant theme, as government regulation became more and more intrusive. In 1908, in the German colony of Southwest Africa, all existing interracial marriages were summarily annulled and outlawed. In 1913, the prominent anthropologist Eugen Fischer called for a national network of clinics for the genetic screening of the entire German population. There was soon an effort to set up marriage-advice clinics to screen those about to be married, in order to establish hereditary health. By 1928, there were 224 marriage-advice clinics in Prussia alone.¹⁴ Little attention was paid to confidentiality or to individual rights, and human health was valued as a national resource, rather than as an individual blessing.

By 1929, Adolph Hitler felt free to speak in public about killing German infants with physical defects, at a rate he estimated to be up to 700,000 children per year.¹³ In 1933 the Nazi party came to power, and they began more actively to promulgate their ideas on racial purity. Physicians, who formed the largest professional group in the Nazi party, were encouraged to see themselves not as doctors to the individual, but as doctors to the nation. In 1934 an Office of Racial Policy was established by the Third Reich, to enlighten the public as to the benefits of applied racial hygiene.¹⁵ The first action of the Office was to establish a nationwide system of genetic health courts, and physicians were required to register all cases of genetic illness

with these courts. A sterilization law was passed which enabled the state to force sterilization on the infirm, and as many as 400,000 people were involuntarily sterilized. The principal reasons given for forcible sterilization were congenital feeble-mindedness, schizophrenia, or hereditary epilepsy.

Within 10 years Hitler's plan to euthanize children also became reality; the Committee for the Scientific Treatment of Severe Genetically Determined Illness was established in 1939, with a mandate to destroy retarded and deformed children. Under the direction of this committee, forms were sent to physicians throughout Germany, ordering them to register deformed or retarded infants with a central authority. Children selected as having "lives unworthy to be lived" were selected and sent to one of 28 killing facilities.¹³ At these facilities, either basic care was withheld until the children died, or else the children were deliberately killed. An estimated 5000 children were killed in this program, usually by morphine injection or cyanide poisoning. Standardized letters were then sent to parents informing them that their child had died an unexpected death because of health problems. This program began by exterminating children up to the age of 3 years, but by 1941 the program had been extended to include those up to the age of 17 years.

Hitler also authorized an adult euthanasia program and ordered that certain doctors be given the power to confer a "mercy death to patients judged incurably sick." In the infamous "T4" program, institutionalized mental patients were targeted for death; six facilities were set up to kill the mentally ill, using gas chambers disguised as showers. A total of 70,273 people were executed in this program, as detailed in meticulously kept official records.¹⁵

But this was only the beginning. Eugenics and the idea of racial purity were soon used as a rationale for the Holocaust, in which perhaps 10 million Jews, Gypsies, and other "undesirable elements" were slaughtered. Jews specifically were targeted for extermination, to improve the purity of the Aryan race. But the SS did not wish to kill all Jews outright; they wanted a ready

source of slave labor as well. Healthy and robust Jews were selected for slave labor, and breeding experiments were begun in order to maintain a steady supply of slaves. But, to ensure that the reproduction of Jews could be controlled, experiments were conducted in the death camps, to determine how rapidly men and women could be sterilized, usually without benefit of anesthesia.

The Hitler Youth and the SS were also part of a massive Nazi program of controlled eugenics. An agency of the SS screened all SS candidates and their fiancées, to determine if these individuals were sufficiently Aryan. Applicants were required to produce documentation of Aryan ancestry going back as far as 1800.¹³ German women generally were encouraged to have children out of wedlock with SS officers, as it was an honor to bear children for the Reich. Arranged marriages were common among members of the Hitler Youth, based on the purity of bloodlines and the possession of health, intelligence, and an Aryan appearance. Another branch of the SS deliberated on the qualities of children from conquered nations, and determined the potential of these children for "Germanization." Thousands of children were summarily taken from their parents in the Netherlands, so that these children could be indoctrinated as Nazis.

Eugenics in the United States

Most Americans know that a great evil was unleashed in Europe, particularly in Germany, in the name of a eugenic ideal. But most do not know that we as a nation are also guilty of abuses in the name of eugenics. Our country has taken more than one step down the slippery slope that leads from eugenic ideas to eugenic ideals.

Interest in eugenics was widespread in the United States at the turn of the century, because many believed that insanity, poverty, delinquency, and criminality were hereditary. As long ago as 1897, a eugenic sterilization bill was introduced into the

Michigan state legislature, calling for castration of the feeble-minded and of some criminals.¹³ Ultimately the bill was defeated, but several institutions proceeded with eugenic sterilization anyway. At the Kansas State Institution for the Feeble Minded, one doctor sterilized 44 boys and 14 girls before public outcry stopped him. In 1907, Indiana became the first state to pass an involuntary sterilization law based on eugenic principles. This law required sterilization of all inmates at state institutions who were insane, feeble-minded, convicted of rape, or habitual criminals. Forced sterilization was legal in 30 states by 1931, and the laws applied to an ambiguously wide range of "defectives," including "sexual perverts, drug fiends, drunkards, epileptics, and diseased degenerate persons." In 1961, 28 states still had laws allowing sterilization of the hopelessly insane or the feeble-minded. The degree to which these laws were enforced varied greatly, but 12 states (California, Georgia, Indiana, Iowa, Kansas, Michigan, Minnesota, North Carolina, North Dakota, Oregon, Virginia, and Wisconsin) each performed more than 1000 sterilizations. As of 1961, there had been 62,162 sterilizations in the United States, with roughly equal numbers of sterilizations performed on the mentally ill and on the feeble-minded. Recently, there has been a trend to repeal sterilization laws but, as of 1987, eugenic sterilization of institutionalized persons was still legal in 19 states, even though the laws are seldom used.

Many states also passed miscegenation laws, meant to prevent interbreeding between races, or what was referred to as "racial mixing."¹² Most miscegenation laws were meant specifically to prevent unions between whites and blacks, based on the flawed assumption that children born to these unions would be inferior. In fact, much of the rationale against cross-racial child-bearing was derived from experiments in which two breeds of animal were crossed. Edward East, a prominent Harvard geneticist, summarized the reasons for prohibiting interracial crosses when he said it was "an illogical extension of altruism . . . to seek to elevate the black race at the cost of lowering the white" because "in reality the negro is inferior to the white. This is not

hypothesis or supposition; it is a crude statement of actual fact."¹⁶

The eugenics movement in the United States was firmly established by 1910, when the biologist Charles Davenport set up the Eugenics Record Office in New York.¹³ Davenport was a prominent scientist who had made his reputation working out the genetics of Huntington's chorea, as well as demonstrating the heritability of eye, skin, and hair color. His Eugenics Record Office was meant to carry out research in human heredity, especially the inheritance of behavioral traits, as well as to educate the lay public about the implications of eugenics for public policy. This office gathered detailed records on thousands of families, and used genealogical information to argue that various social ills, including criminality and poverty, were genetically based. Davenport even argued in 1919 that the ability to be a naval officer was inherited from two genes: a "thalassophilia gene," for love of the sea, and a "hyperkineticism gene," for wanderlust.¹⁷ Davenport believed that the paucity of female naval officers proved that these genes were unique to men. This is a perfect example of the naivete with which claims of heritability were made and accepted in that era. Davenport was apparently so blinded by science that he never considered the possibility that there were few female naval officers because of an active effort to keep women out of the navy, and especially, to keep them out of the officer ranks.

The eugenics movement in the United States was given respectability and popular appeal by a book written in 1916, entitled *The Passing of the Great Race*. In this book, which might as well have been called *In Praise of Anglo-Saxons*, the author made the anti-Semitic statement that "the cross between any of the three European races and a Jew is a Jew." Virtually every textbook on genetics written in the United States between 1910 and 1930 advocated eugenics in one form or another.¹⁸ In one widely used textbook, *The Principles of Genetics*, which was published in the United States in 1925, the author states: "it is to be feared that even under the most favorable surroundings there would still be a great many individuals who are always on the

border line of self-supporting existence and whose contribution to society is so small that the elimination of their stock would be beneficial." In fact, it is nearly impossible to find an American scientist expressing any opposition to eugenics in print until the mid to late 1920s.

An extremely popular book was published in 1921, which described yet another family as illustrative of a tainted bloodline. It told of a soldier who had fathered two lines of offspring, one a degenerate line that originated with a tavern maid, and the other a more respectable line born of a woman the soldier married. Over time, the degenerate line supposedly produced many children who were mentally retarded, while the respectable line produced no retarded children. The conclusion, of course, was that these intellectual differences were hereditary, but there was also the implication that virtue and morality are also heritable.

Beginning in the 1920s, the American Eugenics Society, founded by Charles Davenport and others, began to sponsor "Fitter Families Contests."¹⁷ Whole families were judged like cattle at state fairs around the United States. An amusing photograph, of entrants in a "Fitter Families Contest" at the 1925 Texas State Fair, shows a family, graded in size from the father to the mother on down through five girls, all posed in identical bathing suits. From father to youngest daughter, each member of the family looks like a somewhat smaller version of the person to their right, and each is in a pose of simulated action. The only exception is the youngest daughter, who is looking at the camera in frank bewilderment. One wonders what criteria were used to judge fitter families; were families favored if they all looked the same, or were there more substantive criteria?

The United States maintained an open-door policy of immigration, but this began to change in 1921, when a temporary law was passed restricting entry to those who were financially well-off. This may have been done in an effort to reverse the unemployment and economic slowdown that occurred at the end of the First World War.¹³ The Immigration Restriction League pressured Congress to pass permanent laws to limit

immigration to those of Anglo-Saxon or Nordic descent. Calvin Coolidge, who perhaps should have stayed even more silent, said that "biological laws show . . . that Nordics deteriorate when mixed with other races." That bastion of egalitarian thinking and liberalism, *The Boston Globe*, ran an editorial in 1921 entitled "Danger that world scum will demoralize America," while the president of Stanford University wrote that the "lower races," emigrating into the United States from Eastern Europe and Asia, would reduce "our own average."¹² After much debate in Congress, it was agreed to base future immigration on the mix of nationalities recorded in the 1890 census. The result was a piece of legislation called the Johnson Immigration Restriction Act of 1924, which severely limited immigration of peoples from Eastern or Southern Europe, especially those of Jewish descent.

Eugenics was often a thinly disguised rationale for racism of the worst kind. Edward East, a prominent Harvard geneticist who was a pioneer in hybrid corn research and one of the first to characterize multigenic inheritance, was also a virulent racist.¹⁶ East believed that children born of interracial unions were likely to be genetically inferior to either of their parents because genetic crossing would "break apart those . . . physical and mental qualities which have established a smoothly operating whole in each race by hundreds of generations of natural selection." East believed, on the basis of little or no evidence, that crosses between the races would produce disharmonious results, both in terms of physical traits and in terms of mental abilities. He was also one of the intellectual leaders of the fight to "cut off defective germ-plasm," or staunch the flow of supposedly inferior immigrants from Eastern Europe. This movement culminated in the Immigration Restriction Act of 1924. But East was not the only geneticist who clung to prejudiced ideas well into the 20th century. As late as 1931, *Human Heredity*, the most widely used and well-respected textbook in human genetics, made very sweeping claims about the racial and ethnic characteristics of people without losing credibility.¹² In various places throughout the text can be found the following quotes:

Fraud and the use of insulting language are commoner among Jews. . . .
 In general, a Negro is not inclined to work hard. . . .
 The Mongolian character . . . inclines to (ossification) in the traditional. . . .
 The Russians excel in suffering and in endurance. . . .
 In respect to mental gifts the Nordic race marches in the van of mankind. . . .

And, as late as 1942, two prominent American medical scientists advocated euthanasia for retarded children.¹⁵

"Environmentalism" as a Reaction to the Holocaust

The intellectual tenor of the time began to change, in Europe and in the United States, during the Second World War, in response to the repugnant racial doctrines of the Nazis.¹⁶ Few geneticists were willing to argue, as had the Nazis, that racial mixing was harmful. In fact, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) came out with a statement on race in 1951, signed by 23 prominent geneticists. This statement contained several passages that made a distinct break with pre-War eugenics. For example, the UNESCO statement says that ". . . no biological justification exists for prohibiting intermarriage between persons of different races." The UNESCO statement goes further to say, "Available scientific knowledge provides no basis for believing that the groups of mankind differ in their innate capacity for intellectual and emotional development." This is, in essence, an endorsement of the ideas of "environmentalism," the doctrine that all differences between individuals and races are related to differences in environment and upbringing.

Environmentalism became the fashion, and everywhere intellectuals backed away from eugenics and even from human genetics. Scientific journals deleted the word *eugenics* from their title, and it became very difficult to publish anything on eugenics. The American Genetics Association changed its official credo, from the "improvement of plants, animals, and human racial stocks" to the "improvement of plants, animals, and human welfare." Environmentalism was reduced to the absurd

by B. F. Skinner, who argued that human personality developed as a consequence of the rewards, punishments, sensory inputs, and responses of the developing infant. Skinner seemed to believe the newborn was a blank slate, on which anything at all could be written by parents, siblings, teachers, or friends. Skinner grew famous from his experiments with pigeons in a Skinner box, in which he trained them to do various bizarre tasks for a reward. But he also believed that people could be programmed to behave in predetermined ways, in such a way that would better fit them for a Utopian society. In fact, Skinner went so far as to subject his own child to extended stays in a Skinner box, thereby proving that extreme environmentalism is nearly as prone to perversion as is extreme eugenics.

For many years, there seemed to be a blind spot in the vision of geneticists: it was perfectly correct to speak of the heritability of simple traits in simple organisms, or even to speak of the heritability of disease in humans, but discussion of the heritability of human behavior was tacitly avoided. This trend continued until 1975, when the book *Sociobiology: The New Synthesis* was published by E. O. Wilson of Harvard. This book created a firestorm of controversy because it made the claim that much about human society was explainable in terms of evolutionary forces. Since evolution acts only on the individual, many believed that the implication of the book was racist: differences in the level of advancement of two societies were explainable by differences in the level of advancement of members of those societies.

The Present and Future of Eugenics

Today there appears to be a more balanced view of nature and nurture: a combination of genes and the environment are assumed to play a role in human behavior. Yet the truce between warring camps is somewhat illusory. It is more correct to say that sociologists and biologists have agreed to disagree; most sociologists display an appalling ignorance of basic biology, and most

biologists couldn't care less about sociology. When the two camps collide, warfare is as likely now as in the past. This was shown as recently as 1992, when a conference on the genetics of violence, to be sponsored by the National Institutes of Health, was cancelled because of a vocal minority opposing it. Peter Breggin, of the Center for the Study of Psychiatry, was quoted as saying that behavioral genetics is "another way for a violent, racist society to say people's problems are their own fault, because they carry 'bad' genes." Even more recently, the Department of Health and Human Services attempted to initiate a program of research on violence. This initiative was intended to gather together the separate threads of research into violence, but it offended many who believed that this research was inherently racist.

Political correctness has now hamstrung the ability of sociologists and psychologists to attack problems of social relevance, while leaving molecular biologists free to approach such problems. Yet biologists often fail to consider the social consequences of their research, and to bear in mind the value of diversity, and the principles of tolerance, racial equality, and ethnic sensitivity. In fact, modern biologists are quite caught up in the successes of molecular genetics and may be contributing to an unbalanced view of the role of genetics in human behavior. The remarkable success of molecular genetics in explaining many biological and medical problems has created the expectation that molecular genetics will be able to explain, and eventually to solve, all of humanity's problems.

There is now a misconception that genetics explains all human variation, and that what genetics decrees is immutable.¹² James Watson, Nobel laureate and codiscoverer of the structure of DNA, is quoted as saying, "We used to think our fate was in our stars. Now we know, in large measure, our fate is in our genes." The Human Genome Project has been packaged and sold to the public as a way to find solutions to many of our social, as well as our medical, problems. One prominent scientist is quoted as saying that the sequence of human genes is what "defines a

human being," while another has called DNA "the blueprint for life." The idea that genetics determines our future has inculcated a sort of genetic defeatism, the clearest example of which can be found in *The Bell Curve: Intelligence and Class Structure in American Life*. This book argues that intelligence is genetically determined and essentially unalterable, and that we must somehow find a "valued place in society" even for the dull and ignorant, since we cannot possibly change their lot in life.

An extreme form of reductionism is rampant among biologists; the common viewpoint is that all phenomena, even the human mind, can eventually be explained in terms of chemistry or even physics. Several prominent universities have recently established laboratories to research the mind-brain connection, making the tacit assumption that the human mind can now be explained in chemical terms. Every kind of biology other than molecular is devalued as merely "descriptive" when, in fact, molecular biology itself is simply another level of description. There is a tendency for biologists to assume that a social problem always has roots in genetics, and that somehow genetics can provide a solution to the problem.¹²

The door is now open to a resurgence of the eugenic ideas that led to such gross excesses in the past. We as a society have been reluctant to discuss eugenics openly, although we have already begun to implement policies that can be seen as eugenic in nature. The widespread availability of tests that can diagnose medical problems in the unborn has made negative eugenic selection possible, and even acceptable. Current abortion laws enable a woman to abort any fetus that has an undesirable trait, whether that trait is a proneness to disease or simply being female when a male child is wanted. Effort has been devoted to establishing medical screening tests for sickle-cell disease and other genetic traits, which will create information that can easily be used in a discriminatory fashion. There has been a call to institutionalize orphans in state-run facilities, where they will likely suffer second-rate foster care that may preclude a productive adulthood. Many of these orphans will probably come from

disadvantaged families, so that the orphanages could become a repository for those children for whom society does not have a place. Prisons have already been built to warehouse adults for whom we cannot find another place. The death penalty is again legal in many states, and studies have shown that this final solution is more likely to be invoked when a criminal is a member of a minority group. Efforts to liberalize laws that allow compassionate death or "assisted suicide" are seen as contributing to the dignity of death, but these laws must be evaluated in a eugenic context. When people speak of relieving the burden of suffering of the sick, one must ask whose burden is actually being lifted? Is it that of the individual, or his family, or health care workers, or society at large? Any answer other than "the individual" potentially comes from tainted motives, and begins to sound suspiciously like a eugenics program in action.

The Nature of Nurture *Defining Environmental Influences*

The old dichotomy of nature or nurture, first made by Galton more than a century ago, has been used so far without exploring it more deeply. But this dichotomy is misleading for several reasons, and it is now time for clarification. Most scientists believe that the dichotomy itself is incorrect, and that virtually every trait is mediated by both nature and nurture, working somehow in concert. Furthermore, it is quite outdated to speak of "nature or nurture" when we know that nature, as it was meant by Galton, is equivalent to genes in modern parlance. As has already been discussed; a gene is simply that part of the DNA molecule that specifies the construction of a particular protein. Environment, as Galton used it and as it has been used since, is something of a catchall; everything that is not genetic is, by definition, environmental. But this is intellectually unsatisfying; we must somehow be more explicit about the environmental influences that affect expression of a trait. Or, to put it another way, what is the nature of nurture?

Environmental Influences Broadly Defined

Nurture is often taken to mean the social environment that surrounds and protects the child from birth to independence. This would include early interactions with parents and siblings, as well as the more sporadic interactions with whatever members of the extended family happen to be around. Somewhat