The Thin Line Between Science and Pseudoscience

Genetics and Eugenics from 1900 – 1960

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Introduction
What is Eugenics? What is Genetics?

"Eugenics is the science which deals with all influences that improve the inborn qualities of a race; also with those that develop them to the utmost advantage."[1]
- Francis Galton, 1904

At the turn of the twentieth century the field of genetics, the science behind what makes each individual the unique person they are, was in its infancy. Very little was known about individual characteristics and traits and the study of inheritance was limited. It is not surprising then that at a time when science was trying to establish what was involved in heredity that a movement would arise to fill the void. As a scientist noted at the time, "no principles have more direct bearing on the welfare of man than those of heredity, and yet on scarcely any subject does as wide-spread ignorance prevail."[2]

The nineteenth century was a groundbreaking time in the field of biology. In the latter half of the century, Darwin published his paradigm breaking work *On The Origin of Species: By Means of Natural Selection* in 1859 causing a flurry of other scientists to move to join the new wave of scientific thought. One such person was Francis Galton, a cousin to Darwin and a scientist in his own right. Galton's research centered on what he perceived as the degeneration of the Anglo-Saxon "race" and the desire to rectify that

[1] Francis Galton, "Eugenics: Its Definition, Scope and Aims," in *Eugenics: Then and Now*, ed. Carl Jay Bajema (Stroudsburg: Dowden, Hutchingon and Ross, Inc., 1976), 40.
[2] Michael F. Guyer, *Being Well-Born*: *An Introduction to Eugenics* (Indianapolis: The Bobbs-Merrill Company Publishers, 1916), Preface 1.

alarming trend. In 1883, he coined the term 'eugenics' and saw it as a science in its own right. The purpose, according to Galton, was "to give to the more suitable races or strain of blood a better chance of prevailing speedily over the less suitable than they otherwise would have had."[3] He wanted to improve humanity through the application of scientific methodology, since the knowledge associated with the transmission of inherited characteristics was becoming increasingly worked out. By the 1889, Galton and his fellow researchers perceived that their new work provided "certain definite principles of genetic transmission," as opposed to the "vague general impressions and speculations," that had previously been believed.[4]

The understanding that what had once been unknown was now known helped to bring many more people into the emerging field of scientific eugenics. Among those individuals were scientists who were responsible for developing the related field of genetics. It has been noted that "the roots of many early American geneticists' interest in the eugenics movement lay in the late nineteenth century," at a time when eugenics and genetics both began to emerge.[5]

The study of genetics in the late nineteenth century mainly centered on the principles laid out by the Austrian monk Gregor Mendel. In his 1865 essay "Experiments in Plant Hybridization," Mendel laid out how traits were inherited in hybrid plants, giving ratios

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[3] L.C. Dunn and Th. Dobzhansky, *Heredity, Race, and Society* (New York: The New American Library of World Literature, Inc., 1946), 15.
[4] Guyer, Preface 1.
[5] Kenneth M. Ludmerer, "American Geneticists and the Eugenics Movement: 1905 – 1935," *Journal of the History of Biology* 2, no. 2 (1969): 341, http://www.jstor.org/stable/4330522 (accessed February 4, 2014).

of expected phenotypes based on parental phenotypes. When this work was published, most scientists rejected Mendelian notions, or simply didn't understand them, and believed in other forms of inheritance such as blended inheritance or acquired characteristics.[6] His work with plants eventually gave rise to the field aptly named Mendelian Genetics but at the time of the publication of his work, other scientists barely noticed his accomplishments and insights. However, with the 'rediscovery' of Mendel's work in 1900, the field began to expand and scientists renewed their efforts to learn the science behind inheritance. Scientists began to replicate his findings, giving them attention they had failed to receive in 1865. Originally work was focused on plants and animals but with time it became clear that the same modes of inheritance that were being observed in plants and animals were true for humans. It was this realization that spurred both eugenics and genetics into the twentieth century.

In the first fifteen years of the twentieth century, genetics and eugenics were not easily separated. There were many scientists who were participants in both. While today science would like to be seen as completely objective, with no other purpose than for the advancement of science, in the first years of the twentieth century, the smokescreen of objectivity did not exist. Scientists, especially biologists, were deeply concerned with the application of their work to the real world. Looking at the work of these early scientists, it can be seen that "geneticists' enthusiasm for the movement [eugenics] resulted both from external social and intellectual factors and from factors internal to their science."[7] It

[6] Hans Stubbe, *History of Genetics: From Prehistoric Times to the Rediscovery of Mendel's Laws,* 2nd ed., trans. T.R.W. Waters (Cambridge: The MIT Press, 1972) 150.
[7] Ludmerer, 340.

was not just the pursuit of scientific enlightenment that drove these men but rather the notion that this enlightenment could also better the world and society. As the Progressive Era in the United States moved forward, scientists sought answers for the questions that plagued society. Criminality and feeble-mindedness were seen as real threats and the study of heredity was believed to hold the answers.

What is considered the field of genetics today did not exist during this time. Genetics was still a burgeoning area of research but was not considered its own area of study. Very few universities even offered a degree in genetics, thus making the field limited. It was not until midway through the 1910s that the preponderance of evidence made it clear that genetics was in fact its own field and should be recognized as such. This created a tension in its ties to eugenics that would never be healed.

Significant breakthroughs in the science of heredity came midway through the second decade of the twentieth century. Ideas such as genotype and phenotype were established as well as the chromosomal theory of inheritance. No longer were theories vague, unobservable abstracts. Now they were something that could be observed by anyone. With this came a shift. Scientists wanted to legitimize their field, however, the tie with eugenics was making this difficult. Eugenics saw these breakthroughs as a call to action and many believed that they could "no longer ignore the social responsibilities which the new facts thrust upon us."[8] It was this desire for action that would cause a split between geneticists and eugenicists. Geneticists saw that there was more to be done; eugenicists

[8] Guyer, Preface 1.

saw it as enough evidence to act. The fact that eugenics was reliant on genetics was not lost on geneticists. "Geneticists were quickly to acknowledge the debt that eugenic theory owed to the science of genetics."[9] This debt soon became a burden to the lender who wanted to shed it.

The break came when eugenicists took up their urge to implement their ideas. In the second and third decades of the twentieth century, American eugenicists began to push for government assistance with their efforts through passing legislation. Sterilization laws and immigration laws became the vehicles through which they planned to implement their ideas. Geneticists continued to work and develop the theories that had been founded in the previous decades, some of which began to show that the inheritance that was believed by the eugenicists was not as straight forward as it seemed. Eugenicists ignored this. With the increasingly complex nature of inheritance, their ideas for bettering the race were no longer valid but to acknowledge it would put their plans at risk. Geneticists resented this and saw the possibility that eugenics would delegitimize their field. Instead of allowing their message to be corrupted, geneticists "publicly repudiated it."[10] Instead of using the science to uphold an ideal they wanted, geneticists began to separate themselves from subjectivity. Eugenics placed a value on certain traits or characteristics and sought to either remove or enhance those traits from the population depending on the arbitrary value granted to them based on personal beliefs. Geneticists instead wanted such things to "be solved in accordance with ascertainable facts and

[9] Ludmerer, 342.
[10] Ludmerer, 338.

regardless of our likes and dislikes."[11] This became a clear demarcation between the two. Genetics wanted to be free of the judgment of eugenics while eugenics wanted to cling to the simpler modes of inheritance that followed their plans. Lines were drawn and the strong ties that had existed between eugenics and genetics only decades earlier began to fray.

For the next decade the two fields, eugenics and genetics, continued with this strained relationship. Eugenics was maintaining the belief of old theorems and genetics was moving ahead into new areas of research and legitimacy. As the world entered World War II, this relationship changed irreparably.

Eugenics had achieved some major success in the United States during the period between World War I and World War II. Stricter immigration laws had been passed and sterilization became a reality in many states. The Supreme Court even weighed in, legalizing involuntary sterilization. This decision was made in the case Buck v. Bell, in 1927, which upheld an involuntary sterilization law in Virginia on the grounds of mental retardation.[12] The law allowed for any person to be sterilized should they be found to be feeble-minded by the court system of Virginia. During this same period, Nazi Germany adopted the United States sterilization law as a model for use in the Nazi eugenics program. Over time, the program in Nazi Germany outpaced the American movement resulting in commitment of atrocious acts. Beginning with sterilization in the first part of the 1930s, much like the United States, by the end of the 1930s Nazi eugenicists had

[11] Dunn and Dobzhansky, 34.
[12] Richard Lynn, *Eugenics: A Reassessment* (Westport: Praeger Publishers, 2001), 34.

begun to implement euthanasia as a way to reach their end goal. When these mass murders became public knowledge there was recoil. Eugenics had to shed the long shadow that the Nazis had cast but that was easier said than done. The eugenics movement in the United States was forced to change tactics following this reveal. Instead of pursuing sterilization, they moved on to safer topics, such as birth control until the taboo associated with eugenics became too much and forced the movement underground.

In the years following World War II, there were still eugenicists in the United States who believed in the cause. Leaders in the American Eugenics Society, such as Frederick Osborn and his colleagues continued to support the movement. They strove to rehabilitate the image of the movement, to remove the stigma that had been placed upon it by the public and the Nazis. It was an uphill battle that seemed insurmountable. As eugenicists tried to recapture the public support for their movement, it eventually became clear that there was no way the movement would survive under the name of eugenics. Instead, they morphed into Sociobiology, giving new life to an old movement now under the guise of a legitimate scientific name.

The relationship between eugenics and genetics seemed to move in phases. In the beginning, the two were compatible because of a desire to discover the nature behind inheritance in humans. It was a question both parties sought the answer to. When genetics found an answer, eugenics latched on to it and used it to further its own end goal regardless of the fact that genetics had also moved forward and discredited those ideas.

The two fields began to move apart as their goals changed. Genetics continued to thrive, growing with each discovery and becoming a field in its own right. Eugenics grew until it hit a wall with World War II which caused the whole movement to retreat. In the last years of the movement, supporters tried to revive the eugenics movement to what it had been before the war but faced a jaded public as well as evidence from genetics that proved them wrong at each step. For survival, eugenics merged into a new field of science, sociobiology, using the guise of science to achieve that same purpose.

Chapter One
The Early Period – Between 1900 and 1915

"Eugenics is not mere biology. The problems of eugenics are problems of human society."[13]
- James A. Field, 1911

The rediscovery of the validity of Mendel's laws marked a new period in the study of inheritance and in the study of eugenics. The new ideas of thought that emerged challenged entrenched theories, which scientists had believed for decades. These new theories began to unravel a world in which people could better themselves and those around them which as a result helped spur on both science and the debate surrounding it. In this period, genetics and eugenics were not completely separate fields. Each used the other to justify their work and to support it moving forward, making the two fields interdependent in the early years of the twentieth century.

The Origins of "Classical" Genetics

Geneticists today often referred the early years of the twentieth century as "the era of classical genetics."[14] Work in genetics flourished as Mendelian theory became increasingly recognized as applying to more than just plants and was used as a starting point in which more complex inheritance patterns could be discerned. It was during this time that the word 'genetics' came into use as scientists began to publish works in this

[13] James Field, "The Progress of Eugenics," *The Quarterly Journal of Economics* 26, no. 1 (1911): 167, http://www.jstor.org/stable/1884524 (accessed February 4, 2014).
[14] Stubbe, 290.

specific field. This began as a result of the increased focus on inheritance, which took center stage in the last decades of the nineteenth century.

After the publication of *The Origin of Species* in 1859, Charles Darwin and his ideas about evolution became the focus of a debate on how traits were inherited. Darwin had inferred that nature selected for or against organisms based on their individual characteristics but contemporary science did not have a way to explain how different characteristics could arise in an offspring should their parents display a different trait. Darwin himself had to admit that he did not understand how such a thing happened. The prevailing explanation for inheritance at the time was blending inheritance; the idea that material that conferred inheritance was blending from the parents in offspring. Having no other explanation, Darwin supported that view.[15]

Almost ten years after his groundbreaking work, in 1868, Darwin came up with a new explanation for how traits were inherited which differed from the idea of blending inheritance. His theory was called the "Provisional Hypothesis of Pangenesis,"[16] and he proposed that traits or characteristics were able to change independently of one another due to influence from the mother. It was a way for Darwin to "account for the production of huge numbers of heritable individual differences,"[17] that would thereby also support his work on natural selection. Pangenesis would eventually be discredited but not before moving the scientific debate forward and away from the idea of blending inheritance.

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[15] William B. Provine, *The Origins of Theoretical Population Genetics* (Chicago: The University of Chicago Press, 1971), 6.
[16] Stubbe, 174.
[17] Provine, 9.

During this time, there was another idea on how different traits appeared in a population. The idea of 'acquired characteristics' was popular because it upheld prevailing social ideas about how the environment shaped a person. The principle behind this theory was that an organism would 'acquire' a trait to help it survive and that trait could then be inherited by the offspring. It was proposed by a French scientist named Jean-Baptiste Lamarck and a version of this idea of inheritance, called neo-Lamarckianism, was still held as a credible idea about inheritance into the twentieth century.[18]

As Darwin was working on proving his theories on natural selection, others sought to do the opposite. The idea of natural selection was still a theory in which the debate continued and some scientists sought to prove that Darwin was incorrect. One such opponent was Francis Galton. He believed the "natural selection was ineffective acting upon the small variations Darwin envisioned."[19] Galton's work led to the foundation of Biometrics, a school of thought concerning the mode of inheritance, under which Galton and other believers worked to disprove Darwin's work. Due to his work in biometrics, Galton is regarded by some "as the originator of empirical research in medical genetics."[20] It was from this work and his belief in human betterment that led him to coin the work 'eugenics' in 1883 as a field of science that would focus on studying inheritance

[18] Kathy J. Cooke, "The Limits of Heredity: Nature and Nurture in American Eugenics before 1915," *Journal of the History of Biology* 31, no. 2 (1998): 268, http://www.jstor.org/stable/4331480 (accessed February 4, 2014).
[19] Provine, X.
[20] Stubbe, 177.

so that it "could be perfected in future generation."[21] However, much like Darwin's work on inheritance, Galton's was also disproved when genetics research moved into the twentieth century.

In addition to being a breakthrough in the study of life, Darwin's work also gave value to long standing prejudices. Many scientists applied the idea of natural selection to social situations in the late nineteenth century creating the movement of Social Darwinism. Social Darwinism, along with new ideas of inheritance, would become a call to action for many scientists who would take part in the eugenics movement.[22]

The debate sparked by Darwin and the subsequent work on inheritance led to the notion that human beings could be bettered through scientific involvement. Eugenics had its origins in the early studies of genetics and it would continue to be linked as interest in genetics as a field of science began to grow.

The Era of 'Classical' Genetics and its Role in the Eugenics Movement

The year 1900 marked a change in how the scientific community viewed inheritance. Mendel's ideas remerged as a credible idea on inheritance and scientists began to replicate his results furthering that credibility. It began with agriculture and breeders. Breeders found that his hybrid ratios were seen in livestock and animals. This gave the field of genetics something definitive with which to base their work, something they had

[21] Stubbe, 178.
[22] Ludmerer, 340.

been lacking all throughout the nineteenth century.[23] This would allow scientists, including Thomas Hunt Morgan, a notable American geneticist in the first half of the twentieth century, and others, to expand our understanding of how people inherit characteristics. Meanwhile, eugenics continued to become more popular. The social ills that eugenics claimed were a threat were still plaguing society. People became concerned about how prevalent these issues were and wanted to fix it. Eugenics' supporters used the emergence of Mendel's ideas as a way to implement their belief that they could better humankind. All of this was happening "at a time when the scientific pretensions of eugenics had still to be established."[24] The desire for this establishment would lead to eugenicists grasping at each and every possible mode of inheritance and using them as a way to justify their actions in the goal of human betterment.

Unlike the ideas of blending inheritance or neo-Lamarkianism, Mendel's idea was "that it is not the overall appearance of an individual but individual characters that are inherited."[25] This was very different from the work that had already been done and it gave no credence to the role that environment played in inheritance. The work of the previous century had focused on the role that the environment played on inheritance and some scientists were unwilling to abandon those ideas. Leading geneticists at the time, including Morgan, continued to support the idea that neo-Lamarckianism was a possible

[23] Stubbe, 137.
[24] Field, 33.
[25] Stubbe, 159.

avenue of inheritance even though they were doubtful of its credibility.[26] Mendel's work needed to be supported and research needed to be done to do so.

It was during this time that eugenicists were more concerned with the environment and its role on inheritance rather than on Mendelian ideas.[27] If the environment was a factor in shaping the traits of a person, then the solution was to fix the environment. This "had strong value because its results would more quickly become evident in society,"[28] which was the goal of eugenicists. Coupled with the fact that scientists were reluctant to outright dismiss the idea of neo-Lamarckianism, early eugenicists continued to support environmental reform.[29] Eugenicists were concerned with bettering people and if the role of the environment was vital in what traits were and were not inherited, they would work on environment reform because it aligned with their ideals. This focus would remain as long as the environment impact on inheritance was viable since the alternative, hereditary reform, would take much longer to see an impact.[30] Contemporaries viewed this as problematic, believing that eugenicists efforts in terms of acquired characteristics was due to the fact that they "borrowed from biology freely…undiscriminatingly."[31] Eugenics relied upon genetics for its support of its ideas which is clear when eugenicists abandoned this aspect of the movement when research proved Mendel's laws to hold true about humans as well.

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[26] Cooke, 268.
[27] Cooke, 265.
[28] Cooke, 272.
[29] Cooke, 269.
[30] Cooke, 272.
[31] Field, 24.

Research done within the first decade after the rediscovery of Mendel's work established its importance in the field, thereby discrediting neo-Lamarckianism for good. In 1909, the book *Mendel's Principles of Heredity* was published, illustrating the work that had been done proving that individual characteristics were inherited.[32] By 1910, the preponderance of evidence made it clear that Mendel's laws were applicable not only to the plants Mendel studied or to animals that were important for breeders but to human beings.[33]

Now that inheritance in humans was 'known' and understood, eugenicists at the time believed that they "can no longer ignore the social responsibilities which the new facts thrust upon us."[34] The allure of eugenics became more enticing with the developments in the science leading many geneticists to become involved in the eugenics movement. Ultimately, they believed that their work would have a direct impact on society and it was their responsibility as scientists to make sure that society benefited from it.

Social beliefs during this era led people to believe that it was their responsibility to help society should they posses the ability to do so. It was this belief that compelled many geneticists to support efforts to apply their work on society. Genetics was concerned about the science behind inheritance; eugenics was concerned with the social implications that science could have while applying the science to areas eugenicists saw

[32] Stubbe, 273.
[33] Melinda Gormley, "Scientific Discrimination and the Activist Scientist: L.C. Dunn and the Professionalization of Genetics and Human Genetics in the United States," *Journal of the History of Biology* 42, no. 1 (2009): 39, http://www.jstor.org/stable/40271532 (accessed February 4, 2014).
[34] Guyer, Preface 1.

as an issue. It was the work of genetics that allowed eugenics to be organized as a formal movement by giving it legitimate terms to support its argument about human betterment.[35] It was not lost on observers at the time that eugenics was wholly dependent on genetics for its basis. A commentator in 1911 noted that "most of the solid writing and of the really scientific and useful work has come from biologists."[36]

Eugenics was able to establish itself as a viable movement because of the growth of genetics. The programs of both positive and negative eugenics were established; positive eugenics encompassed the ideas behind "the encouragement of reproduction of those considered to be 'fit'," [37] while negative eugenics worked toward "the prevention of reproduction of those regarded as 'unfit'."[38] The negative aspect was more widely advocated because eugenicists at the time believed that "indirectly a result really more constructive will be achieved,"[39] meaning that there would be a noticeable change in society and that was the goal of the movement. Unknowingly, by pushing for such action, the eugenicists began the split between themselves and geneticists. As eugenics began to push for more action in their program, genetics began to distance itself from the movement from which it used to be so closely aligned.

[35] Ludmerer, 346.
[36] Field, 61.
[37] Ludmerer, 338.
[38] Ludmerer, 338.
[39] Field, 45.

Chapter Two
Tensions – Between 1915 and 1940

"It was only when it was proposed to restrict the propagation of the defective classes on eugenic grounds that the clamor arose."[40]
- S.J. Holmes, 1939

As the twentieth century entered its second decade, it became clear that there were some fundamental discrepancies between the science of eugenics and the ever-growing science of genetics. Scientists who professed to be both eugenicists and geneticists were faced with a dilemma. Continue to support eugenics despite increasing objections from fellow scientists? Or abandon the movement seen to be as a cure to contemporary social problems?

Of that class of scientists who were both eugenicists and geneticists, this dilemma would continue for decades. There was no mass defection, but scientists began to criticize the eugenics movement in ways that it had not been criticized before. By the time World War II began, many, if not most, of the scientists who had once been very vocal supporters of the eugenics movement were now speaking against it. It would be easy to believe the reason for this was the flawed science behind the principles of eugenics but the reason behind the fractured relationship between the eugenics movement and the field of genetics during this time period was infinitely more complicated.

[40] S. J. Holmes, "The Opposition to Eugenics," *Science* 89, no. 2312 (1939): 354, http://www.jstor.org/stable/1664794 (accessed February 9, 2014).

Two Sides of the Same Coin

For years, geneticists had been working to give credibility to their burgeoning field, a field that had not existed as a serious science in its own right in the nineteenth century. Geneticists needed to demonstrate that their field was one worth focusing funds and attention. As a result, "American biologists gained social authority and funding by aligning themselves with the eugenics movement."[41] Eugenics was an idea that the layperson could understand and it appealed to those who saw all that was 'wrong' with society. People sought answers to social ills such as feeble-mindedness and criminality and eugenics filled that need. Genetics became the science behind the movement, thereby allowing it to grow and expand until it reached a point where it could be recognized as its own field of science, separate from biology.

It is clear that "eugenics was originally considered complementary to genetics and based on the scientific study of human heredity,"[42] since many geneticists in the first years of the twentieth century worked to further both fields. Together, the two fields were seen as two sides of the same coin, genetics as the science, eugenics as the application of said science.[43] What tied this all together was the idea that "the linchpin of this activity was a

[41] Gormley, 41.
[42] Gormley, 41.
[43] Diane B. Paul, *Controlling Human Heredity: 1865 to the Present* (Atlantic Highlands, New Jersey: Humanities Press International, 1995), 4.

shared vision of science as a vehicle for progress."[44] Eugenicists moved forward with their plans to implement this progress on society.

Fear of the Kallikak Family

Social 'degeneracy' was a major fear of people during the early period of eugenics and genetics, and this fear split over into the research. Eugenicists wanted to find solutions to this 'degeneracy', but first they had to classify it and quantify it so that others could be educated on the harm such an issue could bring. One such study was done on the Kallikak family in 1912.

This study was not the first of its kind, but those in the eugenics community accepted it as fact as did the public. In this study, eugenicist Henry Herbert Goddard looked at all the descendants of the Kallikak family, examining the role of good heredity versus bad heredity with successive generations. Goddard used this family as an example of the heredity nature of feeble-mindedness, or as we would refer to it today as low intelligence.

Reviews of the study at the time it was published were positive. One reviewer went so far as to say that its "value in the study of heredity cannot be over-estimated."[45] Goddard himself was well known, lending credence to his conclusions as to the negative impact of feeble-mindedness. His notoriety was so important in this study that the same reviewer

[44] Deborah Barrett and Charles Kurzman, "Globalizing Social Movement Theory: The Case of Eugenics," *Theory and Society* 33, no. 5 (2004): 504, http://www.jstor.org/stable/4144884 (accessed February 4, 2014).
[45] John Lisle, "The Kallikak Family, a Study of Feeble-Mindedness by Henry Herbert Goddard," *Journal of the American Institute of Criminal Law and Criminology* 4, no. 3 (1913): 470, http://www.jstor.org/stable/1133393 (accessed April 13, 2014).

continued by saying that "the standing of its author and of the school with which he is connected are such guarantees of the authenticity of its data and the correctness of the work as to make it invaluable."[46]

As the United States entered World War I, the fear of feeble-mindedness was rampant. Not only did the public fear such a label, so did the US Army. The Army conducted intelligence tests on the soldiers and they were not pleased with the results they found.[47] This did not help the growing unease that the public felt about feeble-mindedness; in fact, it only helped it grow.

The impact this study had on society during the time it was published can be seen in our speech today. In his work, Goddard coined the term "moron" as a classification of feeble-mindedness, but today that word is used in common vernacular and not in the way in which Goddard intended.[48] If nothing else, the widespread use of this word today shows how important this study became to people a hundred years ago and how it spurred the interest in eugenical answers to this and other genetic problems in contemporary society.

This study and others like it were not unlike propaganda. It helped create "a 'moral panic' – a belief that society was threatened by a small minority of the hereditary inferior

[46] Lisle, 470.
[47] Paul, 66.
[48] Edgar A. Doll, "H.H. Goddard and the Hereditary Moron," *Science* New Series 126, no. 3269 (1957): 344, http://www.jstor.org/stable/1753955 (accessed April 13, 2014).

who would 'swamp' it if uncontrolled."[49] Eugenicists claimed to know how to control this problem and began to move to implement it.

Up to this point, geneticists seemed to still support eugenics on a fairly large scale. As members of society, they were not immune to feeling the same fears about the future of their population should the 'inferior' become more populous. Much like eugenicists, they saw their science as a way to answer such an issue and research in genetics continued to move forward. Eugenics appeared to be "congruent with the scientific and reformist spirit of the Progressive Era…"[50] in which they lived. However, studies began to show that the laws of inheritance by Mendel that were the basis for the eugenics were found to be lacking. 'Mendelism' was still an active field but it was found to be much more complex than originally believed by either geneticists or eugenicists.[51]

A Eugenical Solution to Feeble-Mindedness

Fears surrounding the feeble-minded and their impact on society gave eugenicists a platform on which to implement their plans. They wanted to better society by eliminating those genes that were seen to be dragging it down. Their answer was sterilization.

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[49] Greta Jones, "Eugenics and Social Policy between the Wars," *The Historical Journal* 25, no. 3 (1982): 726, http://www.jstor.org/stable/2638754 (accessed February 4, 2014).
[50] Paul, 77.
[51] L.C. Dunn, *A Short History of Genetics: The Development of Some of the Main Lines of Thought: 1864 – 1939* (New York: McGraw-Hill Book Company, 1965), 82.

Eugenicists sought to have sterilization laws passed in each state of the union, making it possible to eliminate the genes they saw as responsible for the downturn of society. This became a mode of action, seeking "state action as the most effective means to achieve their goals,"[52] because they could not rely on society itself to fix the issue. They did not want to eliminate those already afflicted; they wanted to prevent anyone in a future generation from being afflicted.[53]

The year the Kallikak study was published, 1912, eight states had sterilization laws and that was only the start.[54] That number would grow as the fervor around the 'inferior' grew. Sterilization laws began to pop up all around the country as mental institutions sought sterilization as a solution to the issue of patient reproduction. Forced sterilization became law of the land in many states and even reached the federal level though the 1927 Supreme Court case Buck v. Bell.

In Buck v. Bell, the sterilization law of the state of Virginia was called into question. The state had tried to forcibly sterilize a woman named Carrie Buck who had been determined to be feeble-minded. The law allowing her doctors to perform the procedure was called into question. The case made its way through the Virginia State Court System, reaching the Supreme Court in 1927. In the end, the court upheld the state's right to sterilize Carrie Buck as long as she had been determined to be feeble-minded. This decision

[52] Barrett and Kurzman, 502.
[53] Barrett and Kurzman, 503.
[54] Paul, 82.

essentially legalized forced sterilization and opened the door for more sterilization laws. By 1931, thirty states had adopted their own version of the sterilization law.[55]

Tensions Appear

As theories in genetics grew through the late 1910s, it became clear to many geneticists that there was an issue with the increasingly close ties that exists between their field and that of eugenics. Amongst the many different reasons that geneticists began to find objection to eugenics at this point in time, there seems to be two general themes. The first was the objection to the implementation of eugenical practices based on science that they found to be more complex than originally imagined. The second was the desire to become a field of science in their own right and fearing that a connection to a movement that was not strictly scientific would taint their claims. Coupled with World War I, views of the world and society were not what they once were, leading to the emergence of anti-eugenic sentiment.[56] It was when eugenicists began to implement their plans that the criticism became public.

Geneticists did not believe that the science the eugenicists were basing their sterilization laws on was correct. Not only were they using outdated inheritance laws, but they were also ignoring other factors that affected inheritance such as the environment and mutations. Eugenicists believed that if they could get a sterilization law implemented in every state, they would be able to noticeably alter the way society looked within their

[55] Lynn, 34.
[56] Donald K. Pickens, *Eugenics and the Progressives* (Nashville: Vanderbilt University Press, 1968), 203.

lifetime. By ignoring the other factors that influenced inheritance, there would be no way for eugenicists to see such results.

When Mendelian inheritance patterns were re-discovered at the turn of the century, previous ways of viewing inheritance were mostly disregarded. One such idea involved the role of the environment in shaping characteristics. Eugenicists did not fight this because it played into their own beliefs as well as that of society's at the time. Galton himself "denied that environment and will had any real effect on human action."[57] If the characteristics of a person were solely due their genes and inheritance, then society was not required to give aid or improve those people's circumstances. If environment was not a factor, bad genetics were and that was not something that could be helped with welfare. Only through the practice of selective breeding could society be improved.[58] Since eugenicists were not likely to look into the role of the environment under this logic, it was up to geneticists and other scientists to do so.[59] In addition to environmental factors, the fact that genes could be mutated was discovered.[60] The explanation of mutations helped to explain an earlier question that surrounded Darwin's theory of evolution while also raising a new question for eugenicists. If genes could mutate, creating 'inferior' genes, how would sterilizing people prevent those mutations from affecting future generations?

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[57] Paul, 33.
[58] Paul, 7.
[59] Franz Boas, "Eugenics," *The Scientific Monthly* 3, no. 5 (1916): 472, http://www.jstor.org/stable/6055 (accessed February 9, 2014).
[60] Dunn, 172.

Adding to this pile of evidence that already called into question the viability of sterilization as a solution came the idea of dominant and recessive traits that were the basis of Mendelian inheritance. Many of the 'inferior' genes that eugenicists hoped to eliminate were, in fact, recessive genes. This mean that even if eugenicists sterilized every person displaying the 'inferior' genes, if they were recessive, that would not eliminate the gene from the population's gene pool. It could be hidden in those who did not display it and passed on should that person have a child with someone else who also carried the gene. This would alter the fairly rapid time table eugenicists had for eliminating genes, meaning it would take much longer to work than estimated.[61] The condition that seemed to be on the forefront of people's minds with this was feeble-mindedness. The work of noted population geneticists, Hardy and Weinberg, and the famous R.C. Punnett showed that it would take eight thousand years in order to rid the population of the feeble-mindedness,[62] and not the lifetime estimate that eugenicists believed. Despite the altered timetable, eugenicists wanted to move forward with their plans. They believed that even if they were not able to eradicate a gene, because of its recessive nature, it would still be a step in the right direction to prevent those who displayed it from procreating because any step forward was a good step.[63]

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[61] Paul, 68.
[62] R.C. Punnett, "Eliminating Feeblemindedness: Ten Per Cent of American Population Probably Carriers of Mental Defect – If Only Those Who are Actually Feebleminded Are Dealt with, It Will Require More Than 8,000 Years to Eliminate the Defect – New Method of Procedure Needed," in *Eugenics: Then and Now,* ed. Carl Jay Bajema (Stroudsburg: Dowden, Hutchingon and Ross, Inc., 1976), 137.
[63] Paul, 69.

The willingness to ignore scientific data in order to reach a personal end goal rubbed some geneticists the wrong way about eugenics. One particularly vocal critic was the scientist L.C. Dunn. He was vocal in cautioning the public against supporting eugenics and the implementation of their policies.[64] Additionally, a noted anthropologist of the era Franz Boas noted that "it will appear that many of the data on which the theory of eugenics is based are unsatisfactory…"[65] As it can be seen, criticism was not limited to those just involved in genetics but those involved in the study of humans and human behavior. It was a matter of good scientific conscious that these men could not support the implementation of eugenics in the way it was being presented during this time period.

Even though scientists did object to the scientific credibility of eugenics, it did not mean that they were against the idea of eugenics in general. Boas, while part of his objection was over the basis for eugenics, his objections went further. He had issues with what was considered 'inferior' genes by eugenicists. He saw a value in eliminated bad traits but he did not approve of the way in which eugenicists came to the conclusion that some traits were 'inferior'.[66] Boas believed that "eugenics alone cannot solve the problem,"[67] that society may face. He, like many others, believed it was much too complex; however, he did see a problem and a need to find a solution.

Much like Boas, Dunn's objections went just beyond the faulty science. Dunn saw eugenics as stifling genetics as a science in its own right, as tainting it and preventing it

[64] Gormley, 35.
[65] Boas, 473.
[66] Boas, 476.
[67] Boas, 477.

from being recognized as being an independent field. He believed that "eugenics has come to mean an effort to foster a program of social improvement rather than an effort to discover fact."[68] When reflecting back on this period, Dunn is quoted as to saying,

> "It will, I think, be clear to anyone who examines the records of the period from 1900 to about the middle thirties that the manner in which the eugenics movement developed cast a long shadow over the growth of sound knowledge in human genetics."[69]

To Dunn, it was not just that eugenicists wanted to implement bad science but that they also hindered further scientific research by propagating wrong information in the name of being science. He wanted it clear that genetics was meant to be judgment free and went so far as to say,

> "It is our duty as scientists to make the facts as clear as possible and to relate them to the evidence. We act in another capacity when we draw moral and ethical lessons from them, and I think these two aspects ought to be made clear."[70]

Dunn did see the scientific value in eugenics, noting that it did succeed in linking inheritance to some diseases but he was very clear on the point that science was not meant to pass judgment. Judgments could be made based on the evidence, but evidence could not be the result of judgments. The latter of which he believed eugenics to be guilty of.

Boas and Dunn were not the only scientists to raise objections. As the United States entered the 1930s, "many geneticists consciously strove to distance their scientific

[68] Gormley, 43.
[69] Gormley, 55.
[70] Gormley, 67.

research from the socio-political campaigns of eugenicists…"[71] while also creating genetics as a field in its own right. Many geneticists at the time believed that they could not be seen as credible if they were still to be linked with eugenics "... in light of eugenicist's heightening misapplication of genetic principles."[72]

Meanwhile, it was during this split that eugenics both reached its height and began to decline. Eugenicists were successful in getting sterilization laws as well as influencing immigration policy. Harry Laughlin, one of the most prominent eugenicists in the United States in the 1920s and 1930s, served as "Expert Eugenical Agent" to the House of Representatives Committee on Immigration and Naturalization.[73] The result of his testimony in the United States Congress was the passage of a restrictive immigration law in 1924. The law restricted immigration from certain countries believed to be home to 'inferior' people. This law was also due in part to the xenophobia that plagued the public at the time, but Laughlin used that to characterize certain undesired classes of foreigners as carries of 'inferior' genes.

All in all, eugenicists were successful in using the state as a way of achieving their goals. The implementation of sterilization laws on a state level with federal approval opened the public to more eugenical propaganda than ever before. However, the success of the American eugenics movement would also play a role in its downfall. They had caught

[71] Gormley, 55.
[72] Gormley, 42.
[73] Lynn, 35.

the eye of eugenicists over in Europe who were about to take their ideas and plans and implement them on a scale that the world had never seen before.

Chapter Three
The End of Eugenics – Between 1945 and 1960

"Eugenics is not a science now – but it will be. It is and will be a field of interest."[74]
- Frederick Osborn, 1961

The beginning of the crisis for the American Eugenics movement came in the 1930s, but it was not until after World War II that eugenics faced its end.[75] When Nazi crimes came to public attention, Americans were horrified at the atrocities carried out in the name of creating a 'master race'. It called into question what Americans had been pursuing in the name of eugenics, causing a backlash. Geneticists continued to publically criticize eugenicists for their faulty science and now the public began to push back as well.

Eugenicists themselves were in a crisis. Some still fiercely supported the movement, going so far as to accusing geneticists as being unfair in their treatment of eugenical research. In a written defense of eugenics, S.J. Holmes wrote in 1939,

> "The poor eugenicists has to struggle against many difficulties in establishing incontrovertible conclusions, and the geneticists may therefore look down a bit condescendingly upon many of the results of eugenic research."[76]

Other eugenicists began to protest at the extremes they saw their fellow eugenicists taking. Some saw the passage of sterilization laws as too extreme a measure in reaching

[74] Edmund Ramsden "Confronting the Stigma of Eugenics: Genetics, Demography and the Problems of Population," *Social Studies of Science* 39, no. 6 (2009): 863, http://www.jstor.org/stable/27793328 (accessed February 4, 2014).
[75] Ramsden, 858.
[76] Holmes, 356.

their goals.[77] This fear can even be seen in some of the most prominent members of the American movement. Charles Davenport, a leader in the American Eugenics movement and a well-known scientist, argued against the sterilization laws that had become so popular, seeing flaws in the science upon which they were based.[78]

Research and work that had once been a cornerstone of eugenical thinking was now called into question. The famous Kallikak family study by Goddard from 1912 was no longer considered the a vital piece of research in the study of inheritance but was "…mocked through the literature as the Kallikak myth…"[79] Eugenics as a science was falling apart at a rapid pace.

Geneticists, meanwhile, were able to achieve their goal of distancing themselves from eugenicists. They still continued to criticize the claims made by eugenicists in the name of science. No longer was eugenics a science, but rather, it was a social movement that had gone too far.

The Build Up to World War II

Eugenicists had seen major success in getting sterilization laws enacted across the United States during the 1930s. This allowed eugenicists the freedom to reach in to more aspects of American society to try and shape the future generation. They became involved in

[77] Paul, 82.
[78] Paul, 83.
[79] Doll, 344.

movements such as birth control and demography, both of which they saw as complementary to their own movement.[80]

Eugenics during this time had becoming increasingly linked to racism, something that some eugenicists were uncomfortable with. In 1939, Frederick Osborn became leader of the American Eugenics Society, the organization that spearheaded eugenics programs across the country. Under his leadership, Osborn tried to move eugenics away from the taint of racism.[81] Osborn tried to further rehabilitate the image of eugenics by admitting publicly to "flaws in early eugenic thinking"[82] and crediting that as being the result of ideology which guided the hand of early eugenicists but was now gone from the movement.

As the world entered World War II, the war effort became the focal point of public attention. After the war, eugenics would never be the same again as Nazi eugenic atrocities came to light.

The Nazi Eugenics Program

The Nazi eugenics program began not unlike the American eugenics movement. It targeted the mentally ill within Nazi Germany, who had diminished them into second-class citizenship. Much like within the United States, eugenic propaganda portrayed these individuals as 'inferior' and as 'drains on society' that had to be prevented from

[80] Barrett and Kurzman, 509.
[81] Paul, 120.
[82] Ramsden, 856.

creating more like them if they were going to achieve their goal of creating the 'master race'. American eugenicists supported the early Nazi eugenics program.[83] Harry Laughlin went so far as to visit Nazi Germany and receive an honorary degree for his work in eugenics. The sterilization laws that had become so popular in the United States reached Germany and the Nazis adapted them for their own use.[84]

Unlike their American counterpart however, the Nazi program moved passed sterilization and "was followed in 1939 by a euthanasia program designed to rid the nation of its mental patients…"[85] Nazi eugenicists had taken American ideas and pushed them to their most extreme conclusion, leading to some of the worse crimes against humanity seen in the modern era. Mass murder became the Nazi solution to their 'social problems' resulting in millions of deaths.[86]

People began to see those individuals who could institute such a plot as "a more significant threat"[87] than the people who were targeted under such a plan. Nazi eugenics had exposed the flaws in the American eugenics movement in a more startling fashion than any of the scientific criticism from the 1920s and 1930s ever had.

[83] Paul, 86.
[84] Paul, 86.
[85] Paul, 90.
[86] Paul, 91.
[87] Ramsden 858.

After The War

With the war over and the world setting back on the path to rebuilding itself, the American eugenics movement was in the mist of a large backlash. The issue of racism within the movement began to be seen as a larger issue as "revulsion at fascist uses of genetics had produced a new reading of old evidence."[88] It was not just the American eugenics movement that was in trouble during this time though. Worldwide, international eugenics programs were facing the same problems eventually leading to their demise.[89]

In the United States, scientists continued to promote caution when looking at eugenic principles. L. C. Dunn continued to be a vocal advocate for this cautious approach while also working to remove judgment from scientific evidence. In writing his book *Heredity, Race and Society* in 1946 with colleague Dobzhansky, they explained,

> "That human diversity leads to both bad and good results should make us pause and consider that it is not the differences themselves which instigate strife and conflicts but rather our way of regarding them."[90]

Dunn wanted people to stop classifying genes as 'inferior' based on incomplete information. Rather, he wanted people to view them as forms of variety within the population.

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[88] Paul, 114.
[89] Barrett and Kurzman, 513.
[90] Dunn and Dobzhansky, 7-8.

The issue of sterilization once again was called into question, now under the light that Nazi extremes had started with sterilization. Some states began to repeal the now infamous sterilization laws. Not all states that had adopted a sterilization law repealed it, but those that did not repeal it hid their sterilization programs from the public. The state no longer was the main way to implement eugenical practices.[91]

No Longer A Science

By the 1950s, American Eugenics was at a turning point. It could either fade into the abyss of failed social movements or it could reform itself to fit the new social climate. The movement chose the latter option to try and save its message that some supporters still believed to be viable.

Under Frederick Osborn, American eugenics began to separate itself from science. In the past, eugenicists used their scientific background as a way to bolster their claims, but now, using science was only proving to further damage the movement. Geneticists and other scientists had resoundingly disproved the claims of eugenicists throughout the decades so it was time to try a different tactic. The new boundaries for eugenics were described as "not a science, but a movement whose ideals and actions depended on further advances in genetic knowledge."[92] This marked a clear change in the attitudes held by eugenicists. What had once been considered a natural extension of human

[91] Alexandra Minna Stern, *Eugenic Nation: Faults and Frontiers of Better Breeding in Modern America* (Berkeley: University of California Press, 2005), 209.
[92] Ramsden, 856.

genetics was no longer being held as true. Now it was a social movement that used genetics, not an extension of genetics itself. It was "an applied science that contributed to liberty, justice and social efficiency,"[93] but not an area of scientific inquiry itself. To scientists, the term 'eugenics' became "a term of opprobrium"[94] in a way it had never been before further distancing eugenics from genetics.

Despite making this clear boundary between science and non-science, Osborn and the American Eugenics Society still strove to make their movement a science once more. Instead of trying to make eugenicists credible scientists though, they attracted scientists who wanted a platform on which to secure their scientific credibility.[95] Scientists would confer credibility upon eugenicists, rather than eugenicists gaining credibility through their own scientific work.

Part of this reform movement was a rebranding of the scientists in its past. Instead of repudiating their works, past eugenicists were cast as victims of their time, "having sacrificed their objectivity in the face of social pressure."[96] This is not without merit. Dunn commented in 1953 that,

> "…eugenical research was not always activated by purely disinterested scientific motives, but was influenced by social and political considerations tending to bring about too rapid application of incompletely proved theses."[97]

[93] Ramsden, 873.
[94] Paul, 124.
[95] Ramsden, 857.
[96] Ramsden, 857.
[97] Gormley, 52.

Eugenics was a product of its era and eugenicists were subject to this pressure. Whether this meant that conditions at the time influenced eugenicists or eugenicists helped shape those conditions is another matter completely. By acknowledging this shortcoming though, Osborn and the American Eugenics Society hoped to bring about wider public support for their movement, much like it had had in the 1920s.

Modern commentators do not agree with this approach. Richard Lynn, a British psychologist known for his views on intelligence saw the reforms taken during this time as "a total repudiation of eugenics."[98] At the time though, these steps were seen as necessary to keep the movement alive.

The End of Eugenics

Despite all his work to rebrand the eugenics movement, the world was no longer in the place it had been when the eugenics movement had emerged on the scene. Society was no longer focused on the fear of social 'degeneracy'. The 1960s saw society begin to expand what it considered equal as issues of segregation and gender took center stage. In light of this change, eugenics could no longer capture the interest of the American public.[99]

By the end of the 1960s, the attempt to reform 'eugenics' came to an end. Frederick Osborn was forced to admit in 1968 that "eugenic goals are most likely to be attained

[98] Lynn, 37.
[99] Ramsden, 865.

under a name other than eugenics."[100] The final blow came in 1972 when "it was finally decided that the damage to the term 'eugenics' was irreversible."[101] The American Eugenics Society, the society that Osborn worked so hard to reform, became the Society for the Study of Social Biology. The field of social biology became the cover for what used to be eugenics, as the word eugenics fell from use in the vernacular. This did not mean that eugenics fell out of use amongst supporters but rather that "it no longer enjoyed open support."[102] Eugenics went underground but it was not buried. It continued through the works done in different areas, areas such as social biology, that did not carry the same stigma that the word eugenics did after World War II.

[100] Paul, 132.
[101] Ramsden, 872.
[102] Barrett and Kurzman, 514.

Conclusion
Can eugenics return? Has it ever been gone?

"The history of the eugenics movement is marked by a sorry record of pseudoscience, prejudice, and bias…"[103]
- *Daniel Wikler, 1999*

It would be simple to look at the history of the eugenics movement and say that it was all a case of misguided individuals trying to better society in any way they could. Such a view would overlook the people who worked to shape the movement and how the movement shaped the public. It would also disregard the role that the development of modern genetics played in fueling such a movement.

In today's society, eugenics is not a common word. Most people would not know its definition off hand, but this was not true a hundred years ago. A century ago, eugenics was commonplace. People knew what eugenics was and what their place was in the movement.

The social aspect of the American Eugenics movement should not be ignored. For the purpose of this look at eugenics, the role of genetics in the shaping of eugenics was what was under examination, not the social aspects. But ignoring the social aspects of the eugenics movement would not allow the full story to be told. Eugenics helped shape the way Americans saw themselves and the rest of the world for decades, allowing for some

[103] Daniel Wikler, "Can We Learn from Eugenics?" *Journal of Medical Ethics* 25, no. 2 (1999): 186, http://www.jstor.org/stable/27718281 (accessed February 4, 2014).

of the worst excesses in human rights violations. It would be nice to think that after World War II and the exposure of the Nazi extremes that eugenics as a viable idea died. That is just not the case.

Eugenics is at its core, according to its founder Francis Galton, "the science of improving stock."[104] To improve human "stock," Galton and his followers believed that selective breeding would be necessary, but this has been done informally for thousands of years People have been working towards this aim since the dawn of time, before a name was given to it. It does not need to be done under a formal title such as eugenics for such principles to be in place. The fundamental action of choosing someone with whom to have children is eugenic in nature. You choose the person who you think is most suited to have your children, the person whose traits you want passed on to your offspring. You refuse to have children with those people who you deem not to be fit to be a parent. This act is the basis for eugenics. Eugenics just places this on a more formalized scientific scale, taking into account an entire population and its gene pool. Coupled with the desire to make the future generation better than its predecessors, eugenics is a natural extension of human nature. However, eugenics places the criteria for deciding these choices with the impersonal control of state agencies rather than with the people involved themselves.

Unfortunately, the history of the eugenics movement shows how it can be corrupted by class and racial biases and led astray by false science. People would like to believe that such a thing could not happen again, that "contemporary science is objective free from

[104] Paul, 3.

the taint of prejudicial interference."[105] The problem with this line of thinking is that eugenicists in the 1920s and 1930s "firmly believed their work to be driven by the values of objective science."[106] Today, we can see that those eugenicists were wrong, but can we see the same in our science now?

As the eugenics movement faded away in the mid-20th century, it did not really die out, but rather transformed itself and changed its name so that it could become more socially palatable to a post-World War II society. Social biology, or sociobiology is the successor to eugenics. This can be seen in the way that "eugenics and sociobiology can overlap in the desire to breed individual organisms to display genes society deems most desirable."[107]

There is always a chance that the eugenics of old can remerged today, becoming "neoeugenic."[108] Neoeugenics would not have to be different from the old eugenics, but rather, it would look different to people today. In the first half of the twentieth century, eugenics was implemented through the state. Sterilization laws and immigration laws were some of the main ways that eugenicists were able to create a situation in which they believed they could better society. Today, eugenics is still believed to be the result of

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[105] Chloe S. Burke and Christopher J. Castaneda, "The Public and Private History of Eugenics: An Introduction," *The Public Historian* 29, no. 3 (2007): 11, http://www.jstor.org/stable/10.1525/tph.2007.29.3.5 (accessed February 4, 2014).
[106] Burke and Castaneda, 11.
[107] N.A. Tiley, *Discovering DNA: Mediations on Genetics and a History of the Science* (New York: Van Nostrand Reinhold Company, 1983), 216.
[108] Maxwell J. Mehlman, "Modern Eugenics and the Law," in *A Century of Eugenics in America: From the Indiana Experiment to the Human Genome Era*, ed. Paul A. Lombardo (Bloomington: Indiana University Press, 2011): 220.

state action and not private action that can result in a similar outcome.[109] This is a fallacy. Eugenics is eugenics whether it is enacted through state actions or private ones. A person choosing to not have children under the idea that they may pass on some undesirable trait has the same outcome of the state telling that same person they cannot have children. The effect is the same.

One of the major problems eugenicists faced at the turn of the 20th century was that they lacked the technology to implement their plans. They did not even know the structure of DNA, let alone how to manipulate it. Today, science has bridged that gap. Geneticists can isolate DNA, sequence DNA and alter DNA to fit their needs. Test animals are bred with genes 'knocked out' or eliminated so that scientists can test their function in living systems. What was impossible a hundred years ago is now done on a daily basis.

There is a possibility that eugenics can reappear without anyone being the wiser. Common practices today, such as genetic screenings and counseling, are not so dissimilar to the eugenic practices of studying family trees to see where 'inferior' traits were introduced.[110] In vitro fertilization gives people who once could not have children the chance to have their own offspring. Sperm banks allow parents to choose the traits they wish to see in their offspring. To people today these practices seem natural and ordinary. Who would pass up the opportunity to choose what traits their child could have? But the act of making that choice means the parents are making a judgment call on what is and is

[109] Mehlman, 221.
[110] Tiley, 221.

not a good trait. At a basic level, that is no different than policies espoused by the eugenics movement one hundred years ago.

Modern society is at risk for heading down the same path trod by early twentieth century eugenicists. The fears that fed the eugenics movement all those years ago have not disappeared, but instead transformed into new fears which could lead to the re-emergence of new forms of eugenics in ways that we cannot yet foresee. As Maxwell Mehlman, a commentator on eugenics and the law, notes, "as the understanding of genetic science expands, the ability to pursue neoeugenic objectives is bound to increase."[111] Society needs to be aware of the dangers inherent in the process and take care not to make the same mistakes as our forefathers. Eugenics as an idea is not a bad thing. It is the extremes people go to see the idea of eugenics fulfilled that is bad. The growth of modern genetics aided in the popularization of these extremes in the first half of the twentieth century. Even with modern understandings of inheritance, a thin line exists between the science of genetics and the pseudoscience of eugenics and we, as a society, must be careful not to cross it.

[111] Mehlman, 235.

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