

Public Health Then and Now

Eugenics and Public Health in American History

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Introduction

Supporters of eugenics, the powerful early 20th-century movement for improving human heredity, often attacked that era's dramatic improvements in public health and medicine for preserving the lives of people they considered hereditarily unfit.¹ However, American public health and eugenics had much in common as well. Surprisingly, the complex relationship between them has not often been studied.² This paper sketches some of the key similarities and differences between eugenics and public health in the United States.

Like such other turn-of-the-century catchwords as *progressivism* and *efficiency*, the term *eugenics* encompassed a large and shifting constellation of meanings. The term was first popularized by Charles Darwin's cousin Sir Francis Galton, who defined it as the science of improving heredity. American eugenicists sponsored a diverse range of activities, including statistically sophisticated analyses of disease inheritance, "better baby contests" modeled on rural livestock shows, forced sterilization of criminals and the retarded, selective ethnic restrictions on immigration, and even euthanasia for those deemed unfit to live.³ These and other programs were seen as eugenic because they all aimed at improving human heredity. But that common denominator also allowed many divergent responses to such key questions as

- What does "improvement" mean?
- What does "heredity" mean?
- By what methods should heredity be improved?
- Who has the authority to answer the other questions?

Disputes over these issues produced very different competing concepts of eugenics⁴ and its relationship to public health.

Eugenics vs Public Health

Many eugenicists regarded disease as nature's way of weeding out the unfit. Charles Davenport, America's foremost eugenic scientist, warned in 1915, "The artificial preservation of those whom the operation of natural agencies tends to eliminate . . . may conceivably destroy the race." He considered it "anti-social" to "unduly restrict the operation of what is one of Nature's greatest racial blessings—death."⁵

His comments exemplified the close kinship between eugenics and earlier Social Darwinist and Malthusian attacks on public health and social welfare programs, a link that remained powerful throughout the history of eugenics. A speaker at the 1914 National Conference on Race Betterment, the first major American eugenics conference, explained that "death is the normal process of elimination in the social organism, and . . . in prolonging the lives of defectives we are tampering with the functioning of the social kidneys."⁶ A speaker at the last such American meeting, the Third International Congress on Eugenics in New York in 1932, echoed the same view: "The growth of sanitation, hygiene, and State medicine . . . attempts to secure an ever-increasing survival rate for the least competent types. . . . This interference with Natural Selection [is] disastrous."⁷ Leading eugenics popularizer Michael Guyer summarized the argument: "[O]ur improved methods of sanitation and care of the sick . . . so eased the rigors of . . . *natural selection* that deca-

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ABSTRACT

Supporters of eugenics, the powerful early 20th-century movement for improving human heredity, often attacked that era's dramatic improvements in public health and medicine for preserving the lives of people they considered hereditarily unfit. Eugenics and public health also battled over whether heredity played a significant role in infectious diseases. However, American public health and eugenics had much in common as well. Eugenic methods often were modeled on the infection control techniques of public health. The goals, values, and concepts of disease of these two movements also often overlapped. This paper sketches some of the key similarities and differences between eugenics and public health in the United States, and it examines how their relationship was shaped by the interaction of science and culture. The results demonstrate that eugenics was not an isolated movement whose significance is confined to the histories of genetics and pseudoscience, but was instead an important and cautionary part of past public health and a general medical history as well. (*Am J Public Health*. 1997;87:1767-1772)

dent stocks . . . are increasing relatively faster than normal stocks.”⁸

A second point of contention between public health and eugenics concerned the role of heredity in infectious diseases. Public health officials generally attributed the era's unprecedented decline in infections to the success of new preventive techniques based on bacteriology and immunology, from water filtration to vaccinations. In the case of tuberculosis, bacteriologists took particular pride in having disproved earlier beliefs that the disease was inherited.⁹ Yet many eugenicists continued to claim that infections, from tuberculosis to syphilis to infant diarrheas, were hereditary.

Historians often ridicule such claims as an unscientific repudiation of the germ theory.¹⁰ However, the struggle between eugenics and public health for jurisdiction over infectious diseases cannot be dismissed that simply. Eugenicists accepted that germs were necessary to cause infections, but they believed that hereditary resistance was the best way to cure and prevent them. One speaker told the Third International Congress, “It has been known for a good while that . . . infections are caused by germ invasions, [but] it needs to be remembered that in most cases medical science is wholly impotent to cure a disease without the aid of the . . . resistance of the individual, and the degree . . . of such resistance is inborn and hereditary.”¹¹ Such arguments were one side of a debate between eugenics and bacteriology concerning which science offered the best techniques for fighting infections. Each side could appeal to both science and logic.

Rivalries such as this one were increasingly characteristic of early 20th-century health sciences. The competition between microbiology and eugenics, like the era's many other similar disputes, was triggered by the emergence of professional specialization. As early as 1906, chemists, nutritionists, and bacteriologists battled over their mutually incompatible approaches to pure food, meat, and milk regulations. Germ-fighting techniques such as pasteurization and use of preservatives were attacked for destroying vitamins, altering taste, and adding toxic chemicals.¹² Such controversies constituted both a struggle for professional power and a substantive contest over incompatible values fostered by the emergence of separate specialty professional cultures.

Early 20th-century health scientists and Progressive Era social reformers expected specialization to be simply an efficient division of labor. So long as each social or medical specialty followed the

same supposedly objective scientific method, each would produce complementary solutions. This faith in the harmonious efficiency of scientific specialization was a central feature of Progressive Era medicine and social reform. But to the extent that differing subjective interests and values proved intrinsic to both medical science and social policy, specialization resulted in competition, not complementarity. The conflict between eugenics and public health resulted in large part from the different values, interests, and methods fostered by two competing medical specialties.¹³

Yet at a deeper level, such conflicts were exacerbated, ironically, by a basic value the opponents shared: the faith that their common allegiance to the scientific method would eliminate such subjective sources of disagreement. To the extent that each side believed in the objective validity of its own science's methods, opposing conclusions could only be attributed to the opponents' bad science or bad faith.

Eugenic Affinities with Public Health

While some advocates of each movement highlighted the differences between the two, others denied or minimized these disagreements. In fact, despite their controversies, eugenics and public health also had much in common.

Public health agencies and eugenics organizations often overlapped in goals and methods, programs, and personnel. Many public health institutions included eugenics in their official duties. The US Public Health Service was in charge of inspecting arriving immigrants for both infectious and hereditary diseases.¹⁴ American Public Health Association founder Stephen Smith appeared in the eugenics segment of the Public Health Service's pioneering 1922 high school biology film, *The Science of Life*, as the prime exemplar of how the combination of good heredity and good hygiene produces healthy long life.¹⁵ Both the Association for the Study and Prevention of Infant Mortality and leading anti-venereal disease organizations had formal sections on eugenics.¹⁶ The Hygiene Reference Board of the Life Extension Institute, a major life insurance industry effort to promote general health education, was chaired by the prominent eugenics leader Professor Irving Fisher of Yale.¹⁷ Likewise, eugenic institutions actively promoted nongenetic programs for general health. Psychologist G. Stanley Hall's plan for a “Department of Eugenics” included

infection control and milk inspection among its duties.¹⁸ America's first eugenics organization, the Race Betterment Foundation, mixed specifically genetic concerns with a much broader range of preventive health measures, including personal and public hygiene, diet, and exercise.¹⁹

This overlap in organizations resulted from important underlying similarities in values and ideas. Thus, many eugenics supporters rejected the claim that disease selectively killed the “unfit.” They argued that hereditary resistance to disease was not a sign of overall genetic superiority and insisted that some highly advantageous traits were actually correlated with heightened susceptibility to particular diseases. The 1912 American translation of a book by Socialist eugenicist and child welfare pioneer Sigmund Engel attacked the “ultra-Darwinian” view that spontaneous infant mortality was beneficial, noting that the leading childhood diseases killed the fit and the unfit alike.²⁰ E. Blanche Sterling, a child hygiene worker for the Public Health Service, reminded the Third International Congress that “in laying so much stress on the fact that we are saving the unfit, the fact that we are also saving the fit seems to have been forgotten. . . . Very superior stock . . . may have no immunity to certain serious diseases and it is our privilege to aid in preserving such strains.”²¹ These views were especially common among women social reformers and child health advocates, for whom eugenics meant not simply “good genes” but “better babies.”²² This debate over whether disease deaths were dysgenic combined scientific and value issues. The unresolved empirical questions included whether disease resistance was hereditary and whether any such hereditary resistance was positively or negatively correlated with other desirable traits. The value issues included which hereditary traits were judged to be beneficial and which traits should be valued most if disease susceptibility turned out to be correlated with something good, such as intelligence.

In addition, regardless of whether disease aided natural selection, many eugenics opposed relying on nature's slow, cruel mechanism of Darwinian evolution. They considered eugenics to mean “artificial selection,” the active intentional control of reproduction to achieve nature's goals by more efficient means. Pioneer eugenic popularizers Paul Popenoe and John Harvey Kellogg explained to the 1914 Race Betterment Conference that the death of “weaklings” constituted “Nature's way, the old method of natural selection.” However, nature's methods were inefficient and inhu-

mane; natural selection therefore "must be supplanted" by eugenic selection.²³ Thus, eugenics and public health could cooperate instead of competing. Public health could continue to prevent the deaths of the unfit so long as eugenics prevented the unfit from passing on their defects.

Even those eugenicists who advocated death for the unfit sometimes won support from prominent public health officials. From 1915 to 1918, Chicago surgeon Harry Haiselden publicly permitted or hastened the deaths of at least six infants he diagnosed as eugenically defective. In the ensuing national debate, he won varying degrees of support from many public health figures, including visiting nurse pioneer Lillian Wald, Food and Drug Administration founder Harvey Wiley, antitoxin pioneer William H. Park, and public hygiene promoter Simon Baruch. Some supporters drew a parallel between eugenics euthanasia and the practice of killing infectious animals to protect public health.²⁴

Convergence of Genes and Germs

Such arguments show that, even in the hotly contested arena of infection control, eugenics and public health could converge as well as compete. For a variety of reasons that illustrate how the meanings of both eugenics and public health were shaped by the interrelation of science and culture, eugenics sometimes was defined to include antibacterial measures.

First, it was widely believed that some of the damage done to people by infections could be biologically inherited by their descendants. In the 19th century, such beliefs had been based on the Lamarckian view that acquired traits could become hereditary. Thus, reform-minded 19th-century eugenicists urged the adoption of public health measures to prevent epidemics from becoming hereditary and to produce health improvements that might themselves be inherited. Such ideas retained support well into the early 20th century.²⁵

By the 1910s, however, scientists generally accepted August Weismann's opposite hypothesis—that environmentally caused changes in the body could not cause corresponding changes in the hereditary "germ plasm." Yet even Weismann's disciples believed that some infections were "germ poisons" that could damage the germ plasm in ways that could be inherited. In this view, catching malaria or typhoid did not cause your children to inherit those specific diseases, but the high fevers they pro-

duced might cause other kinds of birth defects that would be passed on. The scientific reasoning had changed, but the practical conclusion remained the same: that fighting infections could help reduce hereditary disease as well. Germs and genes also were seen as specific, reductionist causes of disease, more technical and less subjective than the broad array of personal and social conditions previously blamed for causing bad health. Progressive Era health reformers still sought to change individual behavior and social conditions, but both germs and genes provided precise targets for these reform efforts, thus making them seem more objective and efficient.²⁶

Second, broad linguistic and cultural associations linked heredity and contagion. Infections were caused by germs; inheritance was governed by germ plasm. In both cases, "germs" meant microscopic seeds. Both types of germs enabled disease to propagate and grow, to spread contamination from the bodies of the diseased to the healthy. The association was strengthened by the identification of blood as a medium of infection for diseases such as malaria, and by the introduction of blood tests for infections from typhoid to syphilis. Blood, the age-old metaphor for heredity, became identified as a vehicle for infection as well. Having "bad blood" meant you were contaminated and contaminating, whether the specific agent was a germ or the germ plasm.²⁷

Eugenics could even be expanded to include not just germ fighting but virtually all of public health. While eugenics aimed at improving heredity, the meaning of *heredity* could reach far beyond genetics. In both common usage and some scientific literature, calling a trait "hereditary" meant that "you got it from your parents," regardless of whether "it" was transmitted by genes or germs, precepts or probate. The Public Health Service film *The Science of Life* defined a man's heredity as "what he receives from his ancestors."²⁸

This expansive definition was based not on wrong science but on broader moral concerns. Attributing something to heredity meant holding the parents morally responsible for having caused it, not necessarily specifying the technical mechanism through which parental responsibility operated. By this definition of heredity, *eugenics* meant not just having good genes but also being a good parent, raising good children, or promoting good health for future generations.²⁹ This version of eugenics was virtually synonymous with public health.

The similarities between infection and heredity also led to parallels in the methods of disease prevention adopted by public

health and eugenics. Eugenicists urged the "segregation" of defectives in institutions, isolating them from society and from members of the opposite sex to prevent their reproduction and the consequent spread of hereditary disease. Such eugenic segregation directly echoed the centuries-old effort to stop the spread of infections through quarantine. The term *segregation* itself first was used medically in the mid-19th century to mean "selective isolation" or "quarantine."³⁰ Infectious germs and bad germ plasm could also be stopped from spreading by a new method called sterilization. In both eugenics and bacteriology, to *sterilize* meant to eliminate the agents that reproduced disease.³¹

Infection control also provided vital legal precedents for the two most important enactments of eugenic legislation. The eugenically based selective ethnic restrictions on immigration adopted by Congress in 1924 drew upon and made permanent earlier immigration restrictions adopted to fight infectious diseases, such as New York's 1892 selective quarantine of Russian Jewish immigrants during that year's typhus epidemic.³²

Forcible sterilization of the unfit likewise drew on both the values and the example of infection control laws. The main legal precedent cited in *Buck v Bell*, the 1927 Supreme Court decision upholding involuntary eugenic sterilization, was *Jacobson v Massachusetts*, the 1905 case allowing mandatory smallpox vaccination. As Justice Oliver Wendell Holmes explained in *Buck v Bell*, "The principle that sustains compulsory vaccination is broad enough to cover cutting the Fallopian."³³

In making this connection, the Court identified three key values that compulsory sterilization shared with vaccination laws. First, preventing disease was better than coping with its consequences. Second, the collective well-being of society could outweigh the interests of individuals who posed an alleged health menace. And third, state power could compel compliance with health measures when persuasion alone appeared inadequate.³⁴

The value placed on disease prevention was graphically articulated in *Buck v Bell*: "It is better for all the world, if instead of waiting to . . . let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their kind."³⁵

In *Jacobson*, the Court held that the state had a moral obligation to value collective safety over individual liberty.

[I]t was the duty of the constituted authorities primarily to keep in view the

welfare, comfort and safety of the many, and not permit the interests of the many to be subordinated to the wishes or convenience of the few. . . . [T]he rights of the individual in respect of his liberty may . . . , under the pressure of great dangers, be subjected to such restraint . . . as the safety of the general public may demand.

Buck v Bell and *Jacobson* each held that the state's authority to enforce compulsory health measures derived from its "police power" and the example of compulsory military service.³⁶

The goals of early 20th-century public health and eugenics also converged to promise the permanent eradication of disease rather than just the reduction of morbidity. Such a thorough and lasting elimination of illness now seemed attainable owing to new concepts in both bacteriology and genetics. Although the similarities between them were not much noted then or since, August Weismann's theory of heredity and Louis Pasteur's view of infection each implied that disease could be not just reduced but eradicated. Both Weismann's rejection of Lamarckian inheritance and Pasteur's refutation of the spontaneous generation of microbes were presented as demonstrations that diseases could not be spawned anew by a bad environment but could only come from specific preexisting seeds. Thus, if all disease germs and all defective germ plasm could be completely wiped out, the diseases they caused would become extinct and could never return. Pasteur and Weismann each made permanent disease eradication seem possible, enabling both eugenics and public health to promise "final solutions" to both infectious and hereditary diseases.³⁷

Eugenics is notorious today for having promoted bigoted concepts of illness, in which race, class, ethnic, religious, and sexual prejudices determined who was defined as unfit. Eugenics leaders regularly portrayed African Americans and Native Americans as loathsome, disease-doomed races.³⁸ Eugenecists also routinely ranked the genetic worth of various European "races." Harvey Wiley summed up what he alleged to be the overwhelming eugenic consensus when he told the readers of *Good Housekeeping* in 1922, "[I]t is universally acknowledged that descendants of the Scotch and Irish Presbyterians . . . have always shown themselves to be a superior people."³⁹ J. G. Wilson, a Public Health Service doctor in charge of examining immigrants on New York's Ellis Island, wrote in the 1913 *Popular Science Monthly*, "[T]he Jews are a highly inbred and psychopathically inclined race" whose defects are "almost entirely due to heredi-

ty." That Jews disagreed with his diagnosis simply confirmed its validity: "The general paranoid attitude of the race is shown in an almost universal tendency to fail to appreciate the point of view of the one who opposes them."⁴⁰

But eugenics was not unique among the health sciences in diagnosing social outcasts as diseased. Medical justifications for racial slavery predated Darwin and Galton, and even in its heyday, eugenics had no monopoly on scientific racism. Bacteriology, not just genetics, was also commonly used to label other races as diseased.⁴¹ Both eugenics and microbiology contributed to the assumptions about racial epidemiology that shaped the Public Health Service's decision to use African-American men for the Tuskegee study of untreated syphilis.⁴²

By emphasizing heredity as the engine of human progress, eugenics expanded the medical importance of ancestry and race. But the identification of which specific races were good or bad was not intrinsic to eugenics. Instead, these diagnoses medicalized broader cultural biases. The specific values that shaped eugenic definitions of disease reflected the eugenicists' primarily White, native, middle-class, professional backgrounds, characteristics they shared with many other professionals, including many public health officials.⁴³

Past and Present

Cultural values thus deeply influenced past eugenics and public health proponents in their definitions of disease and their responses to it. The point is not that, in the benighted past, pure genetics or bacteriology were corrupted by extraneous social concerns. Rather, this history provides some particularly vivid examples of how cultural values have been integral to every effort to define and fight disease. Past eugenics and public health included values most thoughtful people now consider anathema. The problem, then, was not that past health sciences *had* values, but that they had *bad* values.

Racism and other social prejudices became part of both eugenics and public health in the past, not just because these values were prevalent among health professionals, but because health professionals convinced themselves that their sciences were purely objective. Helen Keller, the famed blind and deaf advocate for the disabled, captured the power of this faith when she urged letting doctors select which mentally impaired infants to let die. "A jury of physicians considering the case of an idiot

would be exact and scientific. Their findings would be free from the prejudice and inaccuracy of untrained observation."⁴⁴ This widely shared faith in objectivity did not succeed in eliminating subjective values from medicine, but it did serve to delegitimize the openly political and ethical debate that is necessary if a culture is to assess its value judgments intelligently.

In pointing out that there were similarities as well as differences between eugenics and public health, this paper refutes two comforting but simplistic notions: that eugenics was uniquely value laden, unscientific, and prejudiced; and that any science that is valid and well-intentioned can have nothing in common with eugenics. Some of what was done in the name of eugenics was also done in the name of infection control and public health. Eugenics was not an isolated movement whose significance is confined to the histories of genetics and pseudoscience. It is an important and cautionary part of past public health and of general medical history as well.⁴⁵

However, historical similarities are not moral equivalents. Their intertwined past certainly does not mean that public health was "as bad" as eugenics or that human genetics is "as good" as public health today. Past similarities between eugenics and public health serve as an alarm clock for all the health sciences, not as a lullaby for genetics. □

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Endnotes

1. Today, terms such as *unfit* or *defective* are pejorative and offensive. However, early 20th-century eugenicists considered them to be objective technical diagnoses. At that time, simply using such terms did not necessarily indicate intentional conscious hostility. Nevertheless, this paper argues that, despite this belief in their objectivity, these labels were inherently value based. These terms are used here not to endorse but to understand the values implicit in them and the claims for their objectivity.
2. Historians of eugenics and of public health have long noted the roots of each in Progressive Era social reform, but even this literature does not examine the relationship between the

- two health movements: see, for example, Donald Pickens, *Eugenics and the Progressives* (Nashville, Tenn.: Vanderbilt University Press, 1968). One important recent exception is Edward J. Larson, *Sex, Race, and Science: Eugenics in the Deep South* (Baltimore, Md.: Johns Hopkins University Press, 1995), 85–90. Also see Molly Ladd-Taylor, "Saving Babies and Sterilizing Mothers: Eugenics and Welfare Politics in the Interwar United States," *Social Politics* 4 (Spring 1997):136–153; and D. Kamratlang, "Healing Society: Medical Language in American Eugenics," *Science in Context* 8 (Spring 1995):175–196.
- Historians of Germany have given more attention to this relationship. See, for example, Christopher Browning, *The Path to Genocide* (Cambridge, England: Cambridge University Press, 1992), chap. 7; and Robert Proctor, *Racial Hygiene: Medicine under the Nazis* (Cambridge, Mass.: Harvard University Press, 1988). My essay does not attempt a complete history of this complex relationship, but it is an initial interpretive overview of some key comparisons.
3. The forgotten story of eugenic euthanasia in America is documented in Martin S. Pernick, *The Black Stork: Eugenics and the Death of "Defective" Babies in American Medicine and Motion Pictures since 1915* (New York, N.Y.: Oxford University Press, 1996). See also Francis Galton, "Eugenics: Its Definition, Scope, and Aims," in *Essays in Eugenics* (New York, N.Y.: Garland Press, 1985 [orig. 1909]), 35.
 4. The literature on eugenics is vast. For an introduction to American eugenics, see Diane Paul, *Controlling Human Heredity 1865 to the Present* (Atlantic Highlands, N.J.: Humanities Press, 1996). To place America in a comparative context, see Daniel Kevles, *In the Name of Eugenics* (New York, N.Y.: Knopf, 1985).
 5. Charles Davenport, quoted in "Was the Doctor Right?" *Independent*, January 3, 1916, 23. See also *A Decade of Progress in Eugenics: Scientific Papers of the Third International Congress of Eugenics* (Baltimore, Md.: Williams & Wilkins, 1934), 196, 289–293, 300–313; and Pernick, *Black Stork*, 84, 113.
 6. Leon J. Cole, quoting G. Chatterton-Hill, National Conference on Race Betterment, *Proceedings* 1 (1914), 503.
 7. Cora B. S. Hodson, "Contra-Selection in England," in *Decade of Progress*, 373.
 8. Michael Guyer, *Being Well-Born* (Indianapolis, Ind.: Bobbs-Merrill, 1927), 414.
 9. For an example of how public health became focused on germ fighting, see Charles V. Chapin, "Dirt, Disease, and the Health Officer," *Public Health: Papers and Reports Presented at the Annual Meeting of the American Public Health Association* 28 (1902): 296–299; and Rene Dubos and Jean Dubos, *The White Plague: Tuberculosis, Man and Society* (London, England: Victor Gollancz, 1953), chaps. 4 and 9.
 10. For typical examples, see Kevles, *Name of Eugenics*, 57, 100; Mark Haller, *Eugenics* (New Brunswick, N.J.: Rutgers University Press, 1963), 141–143.
 11. C. G. Campbell in *Decade of Progress*, 291. See also *Eugenics in Race and State: Scientific Papers of the Second International Congress of Eugenics* (Baltimore, Md.: Williams & Wilkins, 1923), 300–301; and Dubos and Dubos, *White Plague*. Until the mid-1930s, antimicrobial drugs for internal use were available clinically only for malaria, diphtheria, and syphilis.
 12. Manfred Wasserman, "Henry L. Coit and the Certified Milk Movement in the Development of Modern Pediatrics," *Bulletin of the History of Medicine* 46 (1972):359–390; Oscar Anderson, *The Health of a Nation: Harvey W. Wiley and the Fight for Pure Food* (Chicago, Ill.: University of Chicago Press, 1958). Related battles also divided bacteriologists from clinicians; see Russell Maulitz, "Physician versus Bacteriologist: The Ideology of Science in Clinical Medicine," in *The Therapeutic Revolution*, ed. Morris Vogel and Charles Rosenberg (Philadelphia, Pa.: University of Pennsylvania Press, 1979), 99–107.
 13. This paragraph paraphrases and summarizes the argument in Pernick, *Black Stork*, 111–114.
 14. Alan M. Kraut, *Silent Travelers: Germs, Genes, and the Immigrant Menace* (New York, N.Y.: Basic Books, 1994), 67–68, 273–276; the Public Health Service inspectors also looked for defects precluding employment, whether "inherited or developed." Despite his subtitle, Kraut concentrates on infectious diseases, not eugenics.
 15. U.S. Public Health Service, *Science of Life* (Bray Productions for USPHS, 1922), reel 12, *General Personal Hygiene*, National Archives Film Collection, College Park, Md., reel 90.26. Smith, who was 99 at the time, died a few months after the film was made.
 16. Richard Meckel, *Save the Babies: American Public Health Reform and the Prevention of Infant Mortality* (Baltimore, Md.: Johns Hopkins University Press, 1990); *Social Hygiene Bulletin* (November 1915):3; *Social Hygiene Bulletin* (January 1916):3; and *Social Hygiene Bulletin* (November 1916):4.
 17. Irving Fisher and Lyman Fisk, *How to Live*, 12th ed. (New York, N.Y.: Funk & Wagnalls, 1917).
 18. Dorothy Ross, *G. Stanley Hall* (Chicago, Ill.: University of Chicago Press, 1972), 362–363, 413.
 19. Race Betterment Conference, *Proceedings* 1 (1914), and *Proceedings* 2 (1915). For more examples, see Larson, *Sex, Race, and Science*, 85–90.
 20. Sigmund Engel, *The Elements of Child-Protection*, trans. Eden Paul (New York, N.Y.: Macmillan, 1912), 47. While Engel regarded natural infant mortality as dysgenic, he strongly supported actively killing those who were medically diagnosed as unfit to live (257–258).
 21. *Decade of Progress*, 344–345. Disease could selectively influence reproduction not only by killing its victims but also by making them infertile. This was one important reason why venereal diseases were the infections that most particularly concerned eugenicists. Some regarded disease-induced sterility as a valuable form of natural selection, but others found the process too unselective and considered the overall decline in fertility caused by infectious sterility to be a form of "race suicide."
 22. Meckel, *Save the Babies*; Larson, *Sex, Race, and Science*, 72–73, 85–90, 131–133; Pernick, *Black Stork*, 53–54, 109–111. See also Renate Bridenthal, Atina Grossmann, and Marion Kaplan, *When Biology Became Destiny: Women in Weimar and Nazi Germany* (New York, N.Y.: Monthly Review Press, 1984).
 23. The quotes are from Popenoe, Race Betterment Conference, *Proceedings* 1 (1914), addendum p. 61. For the similar views of Kellogg, see 89–90.
 24. During this controversy, public health doctors were the medical specialists most likely to be quoted in the press as favoring the death of impaired newborns. However, some very prominent public health figures also opposed euthanasia, including Alice Hamilton, Julia Lathrop, Royal Copeland, and Victor Vaughan: see Pernick, *Black Stork*, 6–7, 35–36, 95.
 25. Charles Rosenberg, "The Bitter Fruit: Heredity, Disease, and Social Thought," in *No Other Gods* (Baltimore, Md.: Johns Hopkins University Press, 1976), 89–97. See also Adrian Desmond, *The Politics of Evolution* (Chicago, Ill.: University of Chicago, 1989). For 20th-century Lamarckian eugenics, see Aldred Scott Warthin, *Creed of a Biologist* (New York, N.Y.: PB Hoeber, 1930), 18; Pernick, *Black Stork*, 206 n. 15.
- However, not all Lamarckians were so optimistic. Many believed that the longer a trait had been transmitted, the longer it took for environmental influences to change it. Since the advances of civilization were more recent than the primitive aspects of human nature, changes in heredity were much more likely to produce atavistic degeneration than progress. Lamarckian pessimists were likely to believe that selective breeding was the only practical way to guarantee improvements in heredity.
26. *Eugenics in Race and State*, 309, 346–347; Allan Brandt, *No Magic Bullet* (New York, N.Y.: Oxford University Press, 1985), 14–15. For related insights into the influence of evolution and Social Darwinist ideas on constructions of the germ theory, see Nancy Tomes, "American Attitudes toward the Germ Theory of Disease," *Journal of the History of Medicine and Allied Sciences* 52 (January 1997): esp. 37–40.
 27. This paragraph paraphrases points made in Pernick, *Black Stork*, 52. For related points, see Keith Wailoo, *Drawing Blood: Technology and Disease Identity in Twentieth-Century America* (Baltimore, Md.: Johns Hopkins University Press, 1997); and Mary Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Danger* (New York, N.Y.: Praeger, 1966).
 28. *Science of Life*, reel 90.26. See also Martin S. Pernick, "Sex Education Films, U.S. Government," *Isis* 84 (1993):766–768.
 29. This paragraph paraphrases Pernick, *Black Stork*, 52–53. On the link between etiology and moral responsibility in public health, see Sylvia Tesh, *Hidden Arguments: Political Ideology and Disease Prevention Policy* (New Brunswick, N.J.: Rutgers University Press, 1988).
 30. Charles S. Bacon, "The Race Problem," *Medicine* [Detroit] 9 (1903):341, exemplifies how racial segregation, both of Native Americans on reservations and of African Americans, was also supported by eugenicists for similar reasons. Racial segregation was intended both to prevent contamination of the White population through miscegenation and to encourage natural selection to eliminate these allegedly defective populations.
- John P. Radford, "Sterilization versus Segregation: Control of the 'Feebleminded' 1900–1938," *Social Science and Medicine* 33 (1991):449–459; *Oxford English Dictionary*, "Segregation," quoting A. Bryson in 1849. On quarantine, see Howard Markel, *Quarantine! East European Jewish Immigrants and the New York City Epidemics of 1892* (Baltimore, Md.: Johns Hopkins University Press, 1997);

- Kraut, *Silent Travelers*. For a typical link between quarantine and eugenics, see *Physical Culture* 21 (January 1909):50.
31. On eugenic sterilization, see Philip R. Reilly, *The Surgical Solution: A History of Involuntary Sterilization in the United States* (Baltimore, Md.: Johns Hopkins University Press, 1991).
 32. Markel, *Quarantine!* esp. 73–74, 181.
 33. *Buck v Bell* 274 US 200 (1927); *Jacobson v Massachusetts* 197 US 11 (1905). The *Jacobson* decision cited the quarantine laws as precedent for limiting individual freedom in the name of collective health. *Buck v Bell* permitted forcible surgery. The law at issue in *Jacobson* punished those who did not get vaccinated but did not authorize physically forcing the procedure on them. Thus, I make a small distinction between “forcible” or “involuntary” (*Buck*) and “compulsory” or “mandatory” (*Jacobson*) measures.

For both *Buck* and *Jacobson*, the specific harm posed by disease was determined to be both medical and economic. Smallpox and imbecility could allegedly be transmitted to others, while society would bear the costs of epidemic disruptions and the care of innocent victims.
 34. Although eugenicists and public health advocates used similar justifications when they sought to deploy government power to enforce their prescriptions, such state coercion was not a necessary or defining feature of either public health or eugenics. Many eugenic and other public health efforts relied on state propaganda, private persuasion, or competitive pressures to supplement or substitute for legal force. Even such extreme measures as eugenic euthanasia were practiced without state involvement, often at the request of an impaired infant’s parent, for the supposed benefit of the individuals as well as of society. See Pernick, *The Black Stork*, esp. chaps. 5, 6, and 9.
 35. *Buck v Bell*. Note that this passage also favorably contrasts eugenic artificial selection with slow, cruel Social Darwinist natural selection.
 36. *Jacobson v Massachusetts*; *Buck v Bell*. Quasi-military models for public health were developed by Johann Peter Frank in the 18th century.
 37. For a brief history of early infectious disease eradication efforts, see Fred L. Soper, “Rehabilitation of the Eradication Concept in Prevention of Communicable Disease,” *Public Health Reports* 80 (1965):855–869. For American eugenic enthusiasm for a “final solution” to disease problems, see Harry Haiselden in *Chicago American*, December 30, 1915, magazine page; and similar concepts of Irving Fisher in Race Betterment Conference, *Proceedings* 2 (1915):64.

Both Pasteur and Weismann extended Rudolf Virchow’s 1858 doctrine that all cells come from other cells.
 38. Bacon, “The Race Problem,” 341. In addition to n. 4 above, see especially Larson, *Sex, Race, and Science*; Kenneth L. Ludmerer, *Genetics and American Society* (Baltimore, Md.: Johns Hopkins University Press, 1972); and Haller, *Eugenics*.
 39. Harvey Wiley, “The Rights of the Unborn,” *Good Housekeeping*, October 1922, 32.
 40. J. G. Wilson, “A Study in Jewish Psychopathology,” *Popular Science Monthly* 82 (1913):265, 271.
 41. Markel, *Quarantine!*; Kraut, *Silent Travelers*. For Nazi images of Jews as infectious germs, see Lucy Dawidowicz, *The War against the Jews, 1933–1945* (New York, N.Y.: Holt, Rinehart and Winston, 1975), 21, 25, 41, 54; Proctor, *Racial Hygiene*, 194–202.
 42. Allan Brandt, “Racism and Research: The Case of the Tuskegee Syphilis Study,” in *Sickness and Health in America*, ed. Judith Leavitt and Ronald Numbers, 2nd ed. (Madison, Wis.: University of Wisconsin Press, 1985), 331–343; James Jones, *Bad Blood: The Tuskegee Syphilis Experiment* (New York, N.Y.: Free Press, 1981).
 43. For specific illustrations, see Pernick, *Black Stork*, chap. 3, esp. 56–75 and 80.
 44. Helen Keller, “Physicians’ Juries for Defective Babies,” *The New Republic*, December 18, 1915, 173–174. See also Pernick, *Black Stork*, 78–80, 97–99, 111–114.
 45. Pernick, *Black Stork*, 175–176.