Expanding Perspectives on Heredity

BY ANDREW J. HOGAN*

STAFFAN MÜLLER-WILLE AND CHRISTINA BRANDT, *Heredity Explored: Between Public Domain and Experimental Science, 1850–1930*. Cambridge, MA: MIT Press, 2016. 480 pp., illus. ISBN: 9780262034432. $49.00.

THEODORE PORTER, *Genetics in the Madhouse: The Unknown History of Human Heredity*. Princeton, NJ: Princeton University Press, 2018. 464 pp., illus. ISBN: 9780691164540. $35.00.

KIM TALLBEAR, *Native American DNA: Tribal Belonging and the False Promise of Genetic Science*. Minneapolis, MN: University of Minnesota Press, 2013. 256 pp. ISBN: 9780816665860. $75.00 (cloth); $25.00 (paper).

INTRODUCTION

There are many ways to learn about one's heredity. One of the oldest, and still most common, is through the stories that our relatives tell us about who we are and from where our ancestors came. We are shown family trees, and told about ethnic heritages, sometimes involving countries that did not yet exist when our families left or were forcefully removed from them. Occasionally we hear about the illnesses that our ancestors had, or how they died. In recent decades, these stories have increasingly been supplemented by the results of genetic testing.[1] Assessments of our ancestral DNA are sold by any number of companies who have helped to create and profited from the desires of people to know

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1. Jenny Reardon, *Race to the Finish: Identity and Governance in an Age of Genomics* (Princeton, NJ: Princeton University Press, 2009); Amade M'charek, *The Human Genome Diversity Project: An Ethnography of Scientific Practice* (Cambridge: Cambridge University Press, 2005).

Historical Studies in the Natural Sciences, Vol. 49, Number 1, pps. 104–115. ISSN 1939-1811, electronic ISSN 1939-182X. DOI: https://doi.org/10.1525/HSNS.2019.49.1.104.

something concrete about their heredity, through genetic markers, which, they are told, can more objectively reveal their family's stories.

Historians of science have long been critical about the knowledge regimes associated with hereditary testing and profiles.[2] The twentieth century is replete with examples of how purported knowledge of heredity has been misused to discriminate, marginalize, sterilize, or murder people and groups. Although influential nineteenth-century figures like Charles Darwin and Francis Galton are often mentioned in these stories, scientific interest and public policies focused on human heredity, and the many sources of hereditary data in the nineteenth century have been understudied. Similarly, conceptions of genetic material and its significance outside of Western scientific medicine often do not figure prominently in our histories of heredity. The books reviewed presently are an important step in correcting these trends, and will certainly benefit historians of science as we work to tell more culturally and institutionally diverse histories of heredity.

NINETEENTH-CENTURY ASYLUM DATA

Theodore Porter's *Genetics in the Madhouse* addresses important and revealing topics that have, until recently, received little attention in the history of science. Notably, much of his book is dedicated to examining data collection and presumptions related to the role of heredity in asylum populations before and during the era of Charles Darwin and Francis Galton. In doing so, Porter addresses human genetics as a human science, rather than one that derives most of its knowledge from model organisms and cell and molecular studies. It is surprising that more work has not been done on conceptions of heredity in

2. Daniel J. Kevles, *In the Name of Eugenics: Genetics and the Uses of Human Heredity* (New York: Alfred A. Knopf, 1985); Alexandra Minna Stern, *Eugenic Nation: Faults and Frontiers of Better Breeding in Modern America* (Berkeley: University of California Press, 2005); Diane B. Paul, *Controlling Human Heredity: 1865 to the Present* (Atlantic Highlands, NJ: Humanities Press, 1995); Nathaniel Comfort, *The Science of Human Perfection: Heredity and Health in American Biomedicine* (New Haven, CT: Yale University Press, 2012); Susan Lindee, *Moments of Truth in Genetic Medicine* (Baltimore: Johns Hopkins University Press, 2005); Dorothy Nelkin and M. Susan Lindee, *The DNA Mystique: The Gene as a Cultural Icon* (New York: W. H. Freeman and Company, 1995); Ruth Schwartz Cowan, *Heredity and Hope: The Case for Genetic Screening* (Cambridge, MA: Harvard University Press, 2008).

nineteenth-century asylums.[3] The relative absence, Porter suggests, has resulted from historians of genetics following the narratives of their actors, which highlight DNA and genes over the collection of data and statistical analysis.[4] *Genetics in the Madhouse* offers a clear and compelling explication of the importance of large amounts of data, collected by way of from asylums, social surveys, national censuses, and other sources, for conducting hereditary and human genetics research since the early nineteenth century.

Porter presents his evidence in three parts, each reflecting a distinct phase of hereditary data collection and analysis. The first period was defined by systematic recordkeeping in asylums and the production of data tables, beginning in the early nineteenth century. This was an era of optimism for the potential of asylums to cure patients, and these records helped physicians specializing in mental illness—who called themselves alienists—to make the case that public investments and medical approaches, including the moral treatment, were indeed working.[5] Porter's second phase, in the mid-to-late nineteenth century, saw the increased standardization of asylum statistics for use in scientific research. There was a desire and need among researchers for more uniformity in the types of data collected and the categories used, so that findings could be combined and made comparable across asylums and nations.[6] The third phase, in the early twentieth century, will be much more familiar to historians of genetics. Here, Porter covers the major promoters of eugenics across the United States and Europe, but helpfully places their work in the context of a previous century of asylum-based hereditary data collection, reflections on the causes of mental illness and deficiency, and the active public health promotion of the need to prevent these conditions by restricting reproduction or discouraging certain pairings.

Porter's analysis of the early nineteenth century in *Genetics in the Madhouse* is as enlightening as it is fascinating to read. Porter describes and reproduces

3. For another excellent history of hereditarian thinking in mid-nineteenth century asylums, see David Wright, *Downs: The History of a Disability* (New York: Oxford University Press, 2011).

4. Porter is well qualified to take on this task: Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995).

5. For more on this era of asylums, see James W. Trent Jr., *Inventing the Feeble Mind: A History of Mental Retardation in the United States* (Berkeley, CA: University of California Press, 1994).

6. On standardization of medical data, see: Geoffrey C. Bowker and Susan Leigh Star, *Sorting Things Out: Classification and Its Consequences* (Cambridge, MA: MIT Press, 1999); Karen A. Rader, *Making Mice: Standardizing Animals for American Biomedical Research, 1900–1955* (Princeton, NJ: Princeton University Press, 2004).

multiple data tables on the causes of madness by French alienist Étienne Esquirol, which reveal his outsized presumption of heredity's significance. Clearly, there was a belief in this period that hereditary factors predisposed certain people to madness. Tracing this however, was a significant challenge for researchers like Esquirol, because many of their hospital charges had little or no knowledge to offer about their family history. Coupled with this problem, more wealthy patients and families tended to obscure the existence of madness in their history, also making it difficult to ascertain the significance of heredity in these populations. The stories that individuals and families told did not fit with the narrower presumptions of researchers, and this was seen as an ongoing problem that needed to be fixed. Moving into the mid-nineteenth century, Porter traces how families were increasingly asked to choose their relative's condition from a list before telling their personal stories, to create more uniformity for the comparison of cases.

In Porter's examination of the mid-nineteenth century, the publication of Darwin's *Origin of Species* is a mere blip in a wave of hereditary thinking.[7] As Porter notes, Darwin had been actively reading asylum research journals, and many alienists were already promoting eugenic perspectives before Galton's coining of the term. By 1859, Porter argues, "eugenics, in a broad sense was old hat" (146). Indeed, concerns about who was having children and how to prevent reproduction by "imbecile and idiotic women" (146) were already major concerns for public health officials in the mid-nineteenth century. During this period, *Genetics in the Madhouse* also traces early hereditary concepts, which to the contemporary ear sound like a gene, such as the German term *Anlage*—and its Danish equivalent *Anlæg*. Each represented an underlying factor causing a hereditary predisposition. Porter highlights the research of Ludwig Dahl on hereditary factors thought to cause mental illness in Norwegian asylums. Dahl hoped to identify a specific *Anlæg*, which could be traced to a single ancestral source and account for all mental illness in an isolated population. This type of thinking, Porter notes, continues to influence searches for causal factors in Native American tribes, like a purported gene for schizophrenia in the Havasupai.

By the late nineteenth century, uniformity in data collection was a key focus of scientists who sought to engage in statistical analysis of asylum and census

7. On Darwin's place in nineteenth-century science, see: Janet Browne, *Charles Darwin: The Power of Place* (New York: Knopf, 2011); Peter J. Bowler, *The Non-Darwinian Revolution: Reinterpreting a Historical Myth* (Baltimore: Johns Hopkins University Press, 1988).

data. Porter highlights many individuals in this period who pushed for uniform questionnaires across asylums and national censuses, to ensure the mass production of mental illness and hereditary data. Although we have often looked to early twentieth-century Mendelism and biometry as the origins of this drive for more standardized data collection, Porter effectively highlights the much earlier origins of this push and the dependence of post-1900 researchers on the information that had been generated previously. As *Genetics in the Madhouse* highlights, however, efforts to standardize forms did not ensure uniformity in how they were completed by asylum officials. In London and New York, large forms were often returned with many blank spaces, or data reflecting gendered presumptions about the causes of mental illness—for instance, the trend that many women, and few men, were assumed to have a hereditary or moral basis for their condition. Ultimately, it was still asylum directors who played the primary role in translating their patients into data sets.

The third section of *Genetics in the Madhouse* offers a more familiar account of eugenic data collection and analysis in early twentieth-century America, Germany, and Britain. In these chapters, Porter shows how data collection and statistical analysis, already well established in the nineteenth century, were translated into eugenic policies and discrimination in the early twentieth century. Once again, we see clear recognition of the complexity in heredity, and yet a hopeful search for simplicity: that individual, Mendelizing genetic traits might be linked to conditions. Throughout his book, Porter makes a strong case for the diverse origins of the study of human heredity and genetics, identifying them much earlier than most historians previously have, and importantly in a variety of fields, including most significantly the management of asylums.

HEREDITY BEFORE AND AFTER MENDELISM

From nineteenth-century bachelors to early twentieth-century paramecia, *Heredity Explored* examines a wide breadth of understandings and debates about heredity between 1850 and 1930. This edited volume is the result of a series of workshops held at the Max Planck Institute for the History of Science in Berlin and the Economic and Social Research Council Center for Genomics in Exeter. *Heredity Explored* is the second of two extensive and important scholarly volumes on evolving conceptions of heredity. The first, *Heredity Produced*, edited by Staffan Müller-Wille and Hans-Jörg Rheinberger,

covered the Renaissance and early modern periods and broached the nineteenth century. This series is also complemented by other significant works involving some of the same scholars, including Müller-Wille and Rheinberger's *A Cultural History of Heredity*, and *Human Heredity in the Twentieth Century*, edited by Bernd Gausemeier, Müller-Wille, and Edmund Ramsden.[8] Taken together, these scholarly contributions provide historians of science and medicine with a masterful overview of studies and concepts of heredity.

The contributors to *Heredity Explored* examine the development, during the late nineteenth and early twentieth centuries, of heredity into an "epistemic object," ultimately taking form as the field of genetics (4). In doing so, the volume examines heredity as it was understood in five overlapping epistemic spaces: genealogy, evolution, agriculture, medicine, and Mendelism. Each section offers a multifaceted view of heredity in the nineteenth and twentieth centuries, highlighting that much research and thinking about heredity during this period took place in applied settings. Not surprisingly, eugenic goals and political ambitions are a constant topic of the volume's chapters. The contributors make it clear however, that eugenics was not a monolithic quest, and eugenic ambitions did not require the term "eugenics," or the identity of eugenicist, to be carried out.

In a fascinating chapter, Diane Paul and Hamish Spencer explore evolving views of cousin marriage on both sides of the Atlantic. Although Francis Galton, George Darwin, and other members the English upper classes had their concerns about the potentially dysgenic effects of cousin marriage, they also recognized that it was a common means of consolidating familial wealth and power and had been practiced by Charles Darwin as well as Queen Victoria.[9] At the same time, cousin marriage was increasingly outlawed in U.S. states, even as many eugenicists questioned whether cousin marriage, especially among members of the "best stock," was indeed all that problematic. The eugenic anti-cousin marriage laws in the United States were this put in place and retained without the explicit support of most eugenicists, hence Paul and Spencer's chapter title, "Eugenics without Eugenicists?" (49). As the

8. Staffan Müller-Wille and Hans-Jörg Rheinberger, eds., *Heredity Produced: At the Crossroads of Biology, Politics, and Culture, 1500–1870* (Cambridge, MA: MIT Press, 2007); Staffan Müller-Wille and Hans-Jörg Rheinberger, *A Cultural History of Heredity* (Chicago: University of Chicago Press, 2012); Bernd Gausemeier, Staffan Müller-Wille, and Edmund Ramsden, eds., *Human Heredity in the Twentieth Century*, (London: Pickering & Chatto, 2013).

9. See also Robert G. Resta, "Whispered Hints," *American Journal of Medical Genetics* 59, no. 2 (1995): 131–33.

authors show, these U.S. state laws were primarily based on folk knowledge rather than scientific studies, which ultimately found little supportive evidence.

The second section of *Heredity Explored* begins with an informative chapter by Rheinberger and Müller-Wille, outlining the history of heredity before genetics, including the perspectives of Darwin, Galton, De Vries, Weissmann, and other key figures. Examining the sources of hereditary knowledge for Darwin, the authors highlight—in line with Porter's *Genetics in the Madhouse*—the significance of both medical and agricultural data. Central to the use of these sources was a conception of "the *temporal* dimension of the epistemic space of heredity" (146). As Rheinberger and Müller-Wille highlight, physicians and agricultural breeders understood variations and deviations, both positive and negative, as occurring over time and generations. Heredity thus became a greater concern for biologists like Darwin when species began to be viewed as changing over time, rather than fixed, as was presumed in the eighteenth century. With this change in perspective, which gained wide acceptance after *Origin of Species*, heredity and variation came to be seen as closely related. This, along with the increasing tendency to distinguish between inheritance and development, began to alter the epistemic space of heredity in the mid-to-late nineteenth century. Rheinberger and Müller-Wille helpfully use this history to challenge a long-standing focus among historians of science on the polarity of "soft" and "hard" heredity. They argue instead for a continuity and fluidity of concepts, especially among physicians, who regularly blended soft and hard mechanisms in conceptualizing the impacts of heredity on their patient's conditions. Ultimately, the authors argue, it was the uptake of Mendelism after 1900 that made these distinctions more significant.

Regression was also an important topic in nineteenth-century evolutionary theory. As Jean Gayon details, "regression" had multiple differing meanings for Darwin and his followers. Regression, also called "reversion" or "degeneration," alternatively implied a return to the prior state of a species, its "type" (169)—often associated with agricultural breeding—or the negative degeneration of an individual, as in the medical context. Gayon goes on to contrast the differing conceptions of regression between Francis Galton and August Weissman. For Weissman, regression disrupted and confused natural selection, whereas for Galton regression was about the statistical return to the mean for a population, which he viewed as maintaining the distinctiveness of the human races. As Gayon convincingly argues, each man's conception of regression was based in their broader philosophy and politics, making their

ideas incompatible. Regression, Gayon suggests, was more of a cultural concern in the late nineteenth century, deriving from fears about a society and human race in a state of decline, than a discrete scientific matter.

Along similar lines, Caroline Arni explores nineteenth-century conceptions of the nature of hereditary transmission from parent to child, combining biological and circumstantial elements. In doing so, Arni highlights the long-standing and continuing assumptions about the significance of a woman's psychological state to a pregnancy's outcomes. She argues that presumed contingencies of conception and pregnancy in the nineteenth and twentieth centuries continued to hold their ground against the search for hereditary laws, and that this has continued in the postwar period with discussions of the effects of "stress hormones" (296) and the current rise of epigenetics. Indeed, just as similar concepts faltered in the late nineteenth century, Arni shows that genetic determinism has and continues to be challenged by a focus on the environment, and in particular on various social phenomena, such as disease, alcoholism, and the effects of war, that were associated in a given era with harming children and bringing about "generational trauma" (297).

In an enlightening chapter, Jean-Paul Gaudillière and Ilana Löwy also focus on hereditary transmission of disease, as it was understood by early twentieth-century physicians, arguing that, with rare exceptions, "they did not actually need Mendelism" (313). The authors particularly focus on cancer, which in some cases was understood to be hereditary. In doing so, they highlight the mouse research of Clarence Little, who created mouse lines that frequently developed cancer. Little, a eugenicist, strongly believed that cancer had a hereditary cause, whereas others held that heredity was just one component of a complex causal mechanism. Gaudillière and Löwy also highlight a few exemplars of Mendelizing conditions, including PKU and Huntington's.[10] However, even British physician and geneticist Lionel Penrose was hesitant to overstate the significance of these diseases, which were quite rare, as models for the value of Mendelism for medicine. In conclusion, Gaudillière and Löwy offer some helpful hypotheses regarding early twentieth-century medicine's continued indifference to Mendelism. These include a continued focus on the complexity of human disease and multifactorial etiologies, which incorporate

10. On the history of genetic conditions, see: Andrew J. Hogan, *Life Histories of Genetic Disease: Patterns and Prevention in Postwar Medical Genetics* (Baltimore: Johns Hopkins University Press, 2016); Ilana Löwy, *Imperfect Pregnancies: A History of Birth Defects and Prenatal Diagnosis* (Baltimore: Johns Hopkins University Press, 2017).

environmental factors. A major factor, of course, was that physicians could not conduct experiments on "pure lines" (328) of humans as they could in mice and other plants. This reality left room for ongoing uncertainty and limited interest by physicians, since Mendelization was rarely a notable or highly informative clinical property.

The final two sections of *Heredity Explored* also examine the rediscovery and uptake of Mendelism in the early twentieth century. In an intriguing chapter on the rediscovery of Mendelism and origins of genetics, Müller-Wille and Marsha Richmond argue that the revolutionary effects of the reemergence of Mendelism are in part an artifact of later scientific and historical interpretations of this period. Research during this era after 1900 remained quite diverse, as past accomplishments were viewed "as mere tools for shaping the future" (383). Bernd Gausemeier explores the increasing tendency during this period to identify various human traits with Mendelian inheritance, as well as resistance to this trend. For instance, Gausemeier highlights the opposition of German physician and statistician Wilhelm Weinberg to the tendency of human geneticists to over extrapolate from individual cases of apparent Mendelian inheritance. As a statistician, Weinberg viewed these associations as a starting point for research, not an important demonstration of inheritance by themselves. Weinberg knew however, that studying humans in this way would be very difficult. As Gausemeier highlights, engaging in such complex population studies of human traits required a political dimension, requiring "total bureaucratic control over populations" (355), a goal widely held by the eugenicists of this era.

Taken as a whole, this volume offers a very diverse view of scientific and medical conceptions of heredity in the nineteenth and early twentieth centuries. Although greater genetic simplicity was often desired, for medical, commercial, and political applications, complexity continued to define the epistemic space of heredity.

EXPLORING ANCESTRAL DNA

In *Native American DNA*, Kim TallBear integrates anthropological, feminist, and indigenous perspectives on heredity and genetics. Specifically, she examines how natural and social orders play a role in the "co-constitution" (23) of various conceptions and uses of DNA. In doing so, TallBear highlights the long-standing power differentials and the colonizing effects of genetics and

other scientific research. In her efforts to "decolonize" (21) research involving indigenous populations, TallBear identifies a useful and powerful ally in feminist scholarship and standpoint theory, which uncovers "both dominations and possibilities unimaginable from a single standpoint"[11] (24). Bringing the knowledge and perspectives of Native Americans on heredity and DNA to the forefront, TallBear helps to empower underrepresented views. For personal, historical, and ethical reasons, however, her primary research subjects are not Native Americans. As TallBear points out, this book is not an ethnography of indigenous people, but rather a study of scientists and companies who study and commercialize Native American DNA.

TallBear begins with a history of scientific and medical racism in America, as applied to both African American and Native populations. This includes an overview of early twentieth-century eugenics and ongoing attempts to link genetics and race. Central to this analysis are long-standing presumptions about the overlaps between blood and genetics in twentieth-century understandings of heredity.[12] As she highlights, using mid-twentieth-century anthropological studies, Native Americans often speak of, or attempt to verify, their identity through talk of "blood." However, the meanings of "blood" are much more complex that the biogenetic contents of blood itself. Tribal membership, TallBear explains, is often determined based on blood quanta, which are ratios determined primarily by family relations and cultural affiliation. For the most part, tribes do not accept or find useful the results of commercial DNA ancestry testing for demonstrating tribal affiliation, though applications occasionally include this data to supplement social ties. In *Native American DNA*, TallBear discourages these increasingly slippery associations between DNA and blood for establishing tribal membership, both among testing companies and Native Americans.

The empirical content of *Native American DNA* comprises online genetic genealogy discussion boards, genome diversity projects, and DNA ancestry companies—a number of which have since closed or merged. There is much to be learned about the social and commercial attributes of DNA ancestry testing, and yet the transient nature of these companies—and the online

11. Donna Haraway, *Modest witness@second millennium. femaleman meets oncomouse: Feminism and Technoscience* (New York: Routledge, 1997); Alison Wylie, "Why Standpoint Matters," in *The Feminist Standpoint Theory Reader*, ed. Sandra G. Harding (New York: Routledge, 2004), 339–51.

12. See also Joanna Radin, *Life on Ice: A History of New Uses for Cold Blood* (Chicago: University of Chicago Press, 2017).

groups that discuss their results—calls into question whether these sources reflect a particular moment in the mid-2000s or longer-term trends. TallBear helpfully highlights the regularity with which these DNA ancestry companies referred to the oft-purported four major racial groups—European, African, Asian, and Native American—the history of which can be traced back to the mid-nineteenth century. These racial categories are, of course, problematic and vast oversimplifications. But, as TallBear points out, they reflect the types of basic knowledge about ancestry that many genetic genealogists believe they want, including the desire of people who identify as of European ancestry to find Native American genetic markers to validate family stories, and to provide "real" and "objective" evidence for college admissions. The same is also true for the human genome diversity projects that TallBear explores, like Genographic, which sell unity and claim to celebrate diversity, while still reducing cultures to genetic haplotypes.

TallBear's ethnography and engagement with a certain genetic genealogy discussion board in 2005 offer a particularly intriguing and insightful view of what interests and presumptions inform DNA ancestry hobbyists. First off, she highlights the high level of scientific conversation in which her actors were generally engaged. Important to the culture of this discussion group was shutting down any threads that were deemed to be political or religious in their focus. This helped to ensure that the conversations remained highly technical in nature, and were not derailed by various academic, political, or cultural critiques of DNA ancestry testing. Once again, in TallBear's account and analysis we see a desire both for acknowledging the reality of genetic complexity and uncertainty, and for restraining the conversation and focus so that simpler social presumptions rooted in genetic "realism" could prevail.[13] TallBear respects the expertise of her actors, but also points out that their knowledge reflects just one form of expertise. When TallBear introduced social science critiques of "genetic fetishism" (121) into the conversation, she often experienced strong resistance against this distinct form of expertise, which most of the posters viewed as a pseudoscientific, politically correct attack on their work.

TallBear's critical analysis of the collection and uses of Native American DNA is strong and compelling. The author offers an important anthropological and indigenous perspective on the promises and shortcomings of seeking

13. For a similarly intriguing account of complexity talk coupled with the hope of simpler findings, see Nicole C. Nelson, *Model Behavior: Animal Experiments, Complexity, and the Genetics of Psychiatric Disorders* (Chicago: University of Chicago Press, 2018).

hereditary understanding through genetic testing. *Native American DNA* begins and ends with valuable insights on how genetic research related to indigenous heredity can be made more inclusive of diverse cultural traditions and can show respect for people who have often been othered by scientific research. This book offers an important reminder to historians of science that the practices of genetic data collection cannot be extracted or treated independently from politics, racial oppression, and global power structures.

CONCLUSIONS

The books reviewed here offer a powerful case that hereditarian thinking in science, medicine, and public policy was common for at least a century before the emergence of Mendelian genetics. Although it comes as no great surprise that the significance of heredity did not come out of nowhere in the early twentieth century, *Genetics in the Madhouse* and *Heredity Explored* offer important evidence for the relevance of hereditary presumptions and analysis long before 1900. This awareness of the long history of heredity data collection projects in asylums and other locations, complements and deepens our understandings of what occurred in the twentieth century, in terms of both scientific debates and social policies. While eugenics as a concept and movement has a particular lineage, these books reveal that there is much to the history of eugenics that lies outside of the use of the term itself and the identification with eugenic causes.

There is also an important lesson to be drawn from *Native American DNA* about the power dynamics and presumptions inherent in human genetics research. TallBear reminds us of the many ways in which genetic genealogies and genomic diversity studies, despite their public appeals highlighting personal knowledge and human unity, are part of long-standing and ongoing racialized and colonializing projects. As each of these excellent books highlights, despite continuous recognition that heredity is a complex and multifaceted trait, there have long been strong social, scientific, and political forces pushing for simpler answers, which capture what really matters about an individual's or group's heredity in just a few data points. Historians of science must continue to join forces with other social scientists to challenge these presumptions and desires for concrete and objective measures of heredity, and to use historical studies to further reveal the often troubling and oppressive outcomes of hereditarian oversimplification.