

Reconstructing Race in Science and Society: Biology Textbooks, 1952–2002¹

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How has growing knowledge about human genetics affected how American textbooks present race? This article analyzes 80 biology textbooks published from 1952 to 2002 to reveal that U.S. biology texts have pursued the topic of race with renewed vigor in recent years. Moreover, textbooks have redefined race as genetic without furnishing empirical evidence for this framing. The textbooks' transformation sheds light on the broader relationship between race and science in the United States, where claims about racial difference have not only drawn instrumentally and selectively from empirical research, but at times forgo scientific grounding altogether. As the textbooks show, both the tight and the loose linkage of race to science can preserve the cultural authority of the race concept. The texts also make clear that race is not a one-time construct or a relic of centuries past. Instead, it is continually remade—and is being reworked today—suggesting its dynamic adaptation for ongoing use as a fundamental tool of social stratification.

Since the early 20th century, a variety of scientists, educators, and public officials have trusted that growing knowledge of human biology would correct erroneous—and pernicious—ideas about race. With this hope, they launched diverse attempts to inform the American public about what they considered to be the true nature of race. In 1939, the American Committee

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for Democracy and Intellectual Freedom, chaired by anthropologist Franz Boas, called on “scientists, school administrators, teachers, and publishers” to “clarify the whole race question in the minds of the young,” principally by ridding textbooks of references to race as a hierarchy of nations or cultures (ACDIF 1939, p. 614). Scientists’ efforts at educating the public were supported by organizations like the U.S. Army as well as schools and churches, which circulated books and pamphlets challenging long-standing beliefs about racial difference. This era’s institutional concern with public understandings of human variation culminated in the series of official statements on race that the United Nations Educational, Scientific, and Cultural Organization (UNESCO) first introduced in 1950.

Academic faith that racism can be fought by addressing basic misconceptions about human difference endures today. The American Anthropological Association (AAA) and the American Sociological Association have both issued official statements that grapple with the definition of race; evolutionary biologist Joseph Graves (2001) has called for new efforts to educate the American public on the topic. Educators also seek to influence lay perceptions of race today through vehicles like the public television documentary *Race: The Power of an Illusion* or the AAA’s traveling and online exhibit “Race.”² The exhibit’s stated goal is that of the wider range of public-education programs: motivated by “continuing misconceptions about race, human variation and racism,” the association aims “to clarify what race is and what race isn’t” (American Anthropological Association 2006).

The many appeals for reform in American teaching of the race concept raise the question of how racial pedagogy has actually changed in the post–World War II era. In particular, given the steady growth and acclaimed successes in the field of genetics over this period, how has knowledge about the human genome affected the ways that race is taught? This article focuses on the high school biology textbook, which provides a first encounter with scientific instruction about the human body for millions of young people every year. By closely analyzing the content of textbooks since the 1950s, I gauge the transformation in their widespread lessons on what race is and what race isn’t.

Textbooks also constitute a strategic research site for examining the formulation (and reformulation) of the notions of human difference that underpin our system of racial stratification. These books are at the in-

² *Race: The Power of an Illusion*, pt. 1: “The Difference between Us”; pt. 2: “The Story We Tell”; pt. 3: “The House We Live In,” produced by Larry Adelman (San Francisco: California Newsreel, 2003). A companion Web site for the series, which originally aired on PBS in April 2003, can be found at www.pbs.org/race/index.htm. The AAA’s traveling program resides online as *Race: Are We So Different?* at <http://www.understandingrace.org/about/index.html>.

terface of scientific and lay belief: although they purport to transmit scientists' insights to the public, they are also tailored to their readership (Keith 1991). From this position, textbooks offer a special vantage point on the development of racial discourse through a process of "working out" expert views in ways that resonate with the audiences of their times. As a result, they shed light on the second question posed by this study: How is the credibility of biological race science, and thus of race, shored up over time—particularly when, as in the late 20th century, either or both come under attack? Because American racial ideology has relied heavily for its legitimacy on claims to scientific proof (Smedley 2007), the successful reconciliation of science and folk knowledge is an essential ingredient for its maintenance and thus for the preservation of our society's racial organization.

This article makes several contributions to sociological understanding of how expert science, especially genetics, informs racial ideology in the United States. Empirically, it is the first study of high school science textbooks that traces how race is defined and depicted. As such, it adds to—and links—scholarship on scientists' race notions and on the popularization of scientific knowledge. Methodologically, it improves upon earlier, related research by examining textbooks in much greater depth and detail, identifying overlooked verbal and visual messages about race. Finally, this article offers two theoretical innovations. First, it introduces a new factor—demography—to explanations of changing racial conceptualization that have largely drawn on political climate, broad-based genetic determinism, and wider transformation in scientific thought and practice. Second, it identifies and proposes a solution to a striking problem raised by the historical examination of race science: namely, how biological race theories have remained standing when their empirical legs have repeatedly been kicked out from under them.

In response to the first question about variation over time in American high school biology textbooks, I will show that the share of texts to teach race declined from the 1950s to the 1990s, when their proportion rebounded. In short, race appears to be returning, not disappearing, as a topic of biological instruction. Equally important, the textbooks' conceptual framing of race has changed markedly over this period, from a model based on phenotype to one grounded in genotype. Strikingly, however, this transition has taken place without the introduction of new empirical data to support it.

These and other findings inform the answer offered to this article's second main inquiry, concerning the maintenance of biological race science. Its viability, I argue, is due to its malleability in making claims, reposing on empirical evidence, and promoting new scientific fields or methods. In other words, the credibility of the concept of race has been

maintained through its constant reformulation: a kind of shell game in which participants are left guessing where the true evidence of racial difference lies.

The centrality of change to the endurance of the race concept has implications for its sociological study. It suggests that race is not an old, obsolete construct—a relic of the past that endures only through inertia—but rather a constantly evolving product of “social reconstruction.” More than previous versions of race, textbooks’ genetic discourse makes clear not only that the race concept is revised over time, but that its restructuring depends on neither scientific data nor public transparency. In short, the genetic model highlights the process of social reconstruction whereby American society has repeatedly adapted race for use as an instrument of inequality, from the 18th century to the 21st.

RACE IN THE GENOMIC AGE

Two conceptualizations.—Research on the human genome has been used to bolster opposing schools of thought on the nature of race. On one hand, the study of human genetics has led some scientists to conclude that racial categories do not reflect meaningful patterns of biological diversity (Marks 1995; Graves 2001). The finding that human beings share 99.9% of their DNA in common is one widely cited argument for setting aside racial categories (see, e.g., American Museum of Natural History 2002); another is that roughly 85% of human genetic variation occurs *within* the boundaries of what we label racial groups, as opposed to *between* them (Lewontin 1972). The extent to which genetics reveal multiracial ancestry in the general population has also been interpreted as a blow to traditional ideas of biological race.

Other researchers, however, interpret genetic science as furnishing evidence of natural racial groupings within the human species (Mayr 2002; Leroi 2005). They argue for example that clustering algorithms applied to human DNA data independently generate the same categories that we recognize as races (Risch et al. 2002). Similarly, “genetic genealogy” companies contend that an individual’s racial heritage can be discerned by analyzing his or her DNA (Bolnick et al. 2007). The idea that race structures patterns of human biological variation has also been lent credence by biomedical studies reporting racial differentials in health outcomes (Lee, Mountain, and Koenig 2001).

These conflicting sets of claims about race, all sustained by growing knowledge of the human genome, have been given several labels. The idea that “[biological] race is real” has been called the “essentialist,” “race-exists,” or “splitter” position. Two platforms oppose that idea: antiessen-

tialism (“biological race does not exist”) and constructionism (“race is a social invention”)—an alliance of notions of what race isn’t and what race is (Morning 2007).

Which viewpoint prevails among scientists today? A growing sociological and anthropological literature on the “geneticization” or “molecularization” of race suggests that essentialist visions remain powerful in the academy (Outram and Ellison 2006; Fullwiley 2007). Related to research on molecularization in the life sciences (Shostak 2005) and genetic determinism in American social and political life more generally (Nelkin and Lindee 1995; Duster 2006), this body of work argues that race is being “reinscribed” or “refashioned” today in terms of DNA (Abu El-Haj 2007). In this view, there is a continuity between contemporary scientific depictions of race and the essentialism of the past; as Duster (2003) memorably put it, earlier race notions have simply been “buried alive” in today’s sciences.

In contrast, many social scientists portray academics as firmly in the constructionist and antiessentialist camp (e.g., Stevens 2003), as opposed to the lay public, which is assumed to be mired in essentialism. Michael Omi (2001, p. 243), for example, writes, “Biologists, geneticists, and physical anthropologists, among others, long ago reached a common understanding that race is not a ‘scientific’ concept rooted in discernible biological differences. Nevertheless, race is commonly and popularly defined in terms of biological traits.” In this view, social and biological scientists form an interdisciplinary avant garde while the public holds fast to outdated concepts.

Race in textbooks.—These conflicting perspectives on the current state of scientific race thinking provide different answers to the first question posed by this article: namely, How has American biological instruction treated the topic of race over the last half century? If the scientific community has rejected essentialist understandings of race, we might expect high school textbooks to have followed suit, but if science has revived such notions within a genetic framework, perhaps educational publishers have done the same. No clearcut answer emerges because of the scarcity of empirical research on this question. The frequent sociological claim that scientists have abandoned racial essentialism is more often an assumption than an empirically documented finding. Conversely, the “race geneticization” argument is based on close study of scientists—their laboratory activities, professional publications, and exchanges (Paradies, Montoya, and Fullerton 2007)—but its empirical focus has not often extended to the public transmission of scientific essentialism. Notable exceptions, moreover, consider restricted (though highly symbolic) channels: the marketing of race-targeted pharmaceuticals (Kahn 2003) and genetic genealogy tests (Bolnick et al. 2007), for example, or scientists’ efforts to

enlist participants in the Human Genome Diversity Project (Reardon 2005). Formal education has received little attention here. This article makes an original empirical contribution, then, by being the first to examine how race is presented in American secondary science education in the genomic age.

This research links the debate on scientists' racial conceptualization to the study of "science popularization," contributing to the intersecting area where neither field is heavily invested. Also labeled "science communication," "public understanding of science," and "public participation in science" (Wynne 1995; Bucchi and Neresini 2008), popularization research originated in inquiry about the public reception of scientists' ideas. Today, however, the flow of ideas is no longer seen as unidirectional (Cooter and Pumfrey 1994). Rather, social scientists describe a process of "coproduction" whereby "societal arrangements affect the kinds of categories that scientists can use to characterize human diversity" (Reardon 2005, p. 9), and scientists' categories shape social order. In addition to historical research on the popular origins and impact of scientists' views of race (Hannaford 1996; Smedley 2007), contemporary studies have traced the incorporation of widespread notions of racial difference in scientific (especially biomedical) research (Lee et al. 2001) and lay interpretations of scientific discourse around genetics and race (Condit et al. 2004).

The coproduction model clarifies what textbook analysis contributes to the study of both scientific and popular notions about race. Although textbooks have often been seen simply as the product of scientific thought—that is, compilations of agreed-upon scientific knowledge (Kuhn [1962] 1996)—they are also the product of public beliefs and tastes. Simultaneously scientific publications, consumer goods for market purchase, and government-regulated treatises, these textbooks are not only tailored to scientists' specifications but subjected to commercial and political pressures as well (Skoog 1992). From their position at the intersection of academic science and the lay public, then, textbooks offer an important vantage point on the confluence of scientific and popular concepts of race. They reflect—albeit imperfectly—the scientific race views of their era, and they reveal what messages about race are being widely presented to the public as "scientific." Equally important, textbooks embody a hybrid knowledge, informed by both expert and lay imagery. We can read them as the results of a process of "working out" scientific ideas for public consumption and credence. As such, they offer insight into how certain racial beliefs are fashioned, made credible, and perpetuated.

Previous research on race in U.S. textbooks.—Very little empirical research has taken up the question of how textbooks define the race concept; studies of race in youth literature usually focus on evidence of racism, primarily in the humanities (e.g., Elson 1964; Selden 1999). Although

Franz Boas's 1939 textbook study with the American Committee for Democracy and Intellectual Freedom is an exception (ACDIF 1939), it is of greater historical than contemporary relevance.

Anthropologists Leonard Lieberman and Alice Littlefield offer the most comprehensive examination to date of changing racial conceptualization in American formal education. In studies with colleagues, Lieberman and Littlefield examined convenience samples of 77 college texts in biology and 69 in physical anthropology, all published between 1932 and 1989. They found that physical anthropology texts maintained that biological races exist (the essentialist "splitting" view) until the 1970s, when they began to promote the opposite "races do not exist" (or "lumping") view (Lieberman et al. 1992, p. 301). The biology textbooks, in contrast, never underwent such a reversal. As late as the 1975–83 period, more than half of the biology texts still taught that biological race exists (Hallead 1983). A follow-up examination of eight texts published from 1987 to 1989 found that next, instead of adopting the opposite argument (as the anthropology books did), college biology texts dropped their discussions of race altogether (Lieberman et al. 1992). In short, though both the physical anthropology and biology texts began to move away from the position that race exists in the late 1960s and early 1970s, only the anthropology texts went on to switch sides entirely and espouse the view that race does not exist. Biology textbooks appear to have simply moved from affirming the existence of race to omitting mention of it.

Lieberman and Littlefield's work is an important starting point for the present inquiry, but it is limited in two significant ways. First, its time frame: the anthropologists analyzed books that were published prior to 1990, well before some of the advances in genetic research that have given rise to new discussions of DNA and difference. Second, the researchers classified textbooks in a cursory manner, forgoing much of the depth and nuance that textual analysis has to offer. Specifically, they constructed only a binary variable of whether each textbook adhered to a "races exist" or "races do not exist" position. Boiling analysis down to a simple dichotomy means overlooking a great deal of verbal and visual content in which race is defined, described, and deployed. This pared-down approach calls the anthropologists' conclusions into question: Have biology texts really given up discussing race altogether, or have they shifted their coverage of race to places or forms the researchers did not detect?

RESEARCH DESIGN

In this study I present new empirical findings by adopting a thorough approach to content analysis. Rather than simply categorizing each book

as teaching either that “races exist” or “races do not exist,” I explore more deeply. Do the textbooks explicitly define the term “race”? Are races cataloged or described? Do the textbooks account for the development of races? What do their illustrations convey? There are myriad ways in which textbooks shape our understanding of race; analyzing their contents along multiple dimensions is indispensable for a full depiction of what they teach about the nature of race.

My project also differs from that of Lieberman and Littlefield by focusing on high school rather than college texts. This choice of research site is motivated by the much wider audience that high school texts reach: only half of the American population 25 years old and older has been exposed to some college education, whereas over 90% have some high school education (NCES 2002). Biology classes are also more likely to be mandatory at the high school level than in college, thus reaching a larger share of that bigger secondary-student population. Finally, by reaching students at a younger age, high school textbooks offer an early—and thus particularly influential—introduction to scientific thought about the human body. All these factors augment the impact that textbooks already have on their readers given the widespread belief that they are definitive sources of accurate and uncontested scientific understandings of the world (Foshay 1990). The principal drawback to focusing on secondary and not tertiary education, however, is that fewer subjects are taught at lower levels, precluding disciplinary comparisons to fields like physical anthropology.

Data.—To take the historical measure of biology textbooks’ race-related content, I analyze a sample of 80 high school texts published in the United States between 1952 and 2002. The sample was not randomly selected, but rather aims to represent the most widely used textbooks of successive time periods. In the absence of publicly available information on circulation or revenues, however, I can gauge text popularity only indirectly. I do so in two ways. First, I rely on a textbook depository—that is, an institution to which major publishers routinely send their new materials—for the bulk (65%) of the sample. Columbia University’s Teachers College is one such depository and has a particularly rich collection from the mid-20th century. I obtained 52 textbooks published between 1952 and 1993 from its historical archive.

Second, to obtain the most popular *recent* texts, I turned to two sources. One was a list of 10 “widely used and newly developed” high school biology texts that the American Association for the Advancement of Science (AAAS) published in 2000 (Project 2061 2000). The other was the body of curricular lists that “textbook adoption” states draw up. These 20-odd states (the number fluctuates over time) centralize their schools’ choice or purchase of textbooks, usually by circulating lists of books from

which schools are required or encouraged to choose. To identify the most widely used texts, I consulted the 2002 curricular lists of the six adoption states with the largest high-school-age populations in 2000: California, Texas, Florida, North Carolina, Illinois, and Georgia, which together represented 35% of the total national population ages 15–19 (U.S. Census Bureau 2001).³ Selecting the general biology texts most frequently mentioned on state high school adoption lists (and/or appearing on the AAAS “top 10” list) added 11 books, published from 1994 to 2002, or 14% of the sample.

The two sampling approaches described above did not completely cover the time period under study, however. Specifically, the Teachers College archive tapered off in the 1980s, and the search of state adoption lists yielded books published after 1993. To fill the resulting gap of roughly a decade, I turned to a local miniarchive of sorts: the biology library of a private high school in New York City. Here I obtained 17 textbooks (21% of the total sample), published from 1968 to 1994.

Drawing a longitudinal sample of textbooks from a single source is unlikely because old editions are unlikely to be found in the same places as current ones. But building a historical collection from a series of subsamples raises the question of whether each is an unbiased sample from the same population. If not, changes over time in sample characteristics might be an artifact of changing sample composition, rather than a reflection of real underlying variation. To ensure this was not the case, I compared the three subsamples in terms of both characteristics that are unrelated to the dependent variable of racial conceptualization—namely, (a) authorship, (b) edition series (i.e., whether a subsample contains an earlier or later edition of a text included in another subsample), (c) publisher, and (d) coverage of evolutionary theory—and results on two (dependent) outcomes of interest. In both sets of analyses, I found a great deal of similarity across subsamples (see app. A).

Analysis.— Analyzing textbooks poses special methodological challenges. Each book was a hardcover that ran several hundred pages long, requiring a strategy for identifying and organizing relevant material. To

³ Although southern and western states make up the majority of adoption states, it is often argued that their large purchasing contracts so thoroughly drive textbook publishers' production that their choices effectively determine which textbooks are available to the rest of the nation (Squire and Morgan 1990). Furthermore, the compression of the American textbook publishing industry to a handful of large conglomerates in recent decades means that the same reduced pool of textbooks is being marketed to both adoption and nonadoption states (Ravitch 1996). In 2000, just five companies (Harcourt/Vivendi, Houghton Mifflin/Reed Elsevier, McGraw-Hill, Pearson, and Scholastic) earned approximately 90% of the sales in the \$4.5 billion U.S. textbook market (Education Market Research 2001). For these reasons, the geographic skew of the adoption lists is unlikely to result in a nonrepresentative sample of the national market.

begin locating passages that touched on race, I searched each book's index pages for the terms "race," "ethnicity," human "stocks" or "varieties," and race labels like "blacks," "Caucasoids," and "Orientals." Following each index reference to a textual passage identified the topics most likely to be associated with race, such as heredity, evolution, and speciation. Using this inductive method and deductively adding other topics (like Linnean nomenclature), I compiled a list of race-linked topics to target in a second pass, searching each book for passages on these topics, and each passage for mention of race.

Not all textbook teaching on race can be located in this way. Textbook discussions of race can be grouped into three types, and only the first two can be systematically identified using the method described above. The easiest passages to find are those that involve what I call *direct discussion* of race: they focus explicitly on race—for example, in listing "the races of man"—in order to deliberately explain the concept to the reader. *Indirect discussions* of race, in contrast, refer to race briefly but do not concentrate on it—their focus is on teaching something else. For example, a description of forensic science might list race among the characteristics that investigators can determine from a human skeleton (e.g., Biological Sciences Curriculum Study 1987). Finally, *implicit discussion* is the most difficult to identify because race is not explicitly mentioned. Yet these passages (whether with words or illustrations) can be read as incorporating an unstated racial subtext. An example might be one of the many textbook photographs of "primitive" peoples; they invariably depict people of color, thus reinforcing stereotypes of European superiority (see, e.g., Smallwood and Green 1968).

The analyses that follow concentrate on direct and indirect discourse. These forms are particularly suited to marking trends over time because they are relatively objective indicators of the presence of race in a given text. Identifying implicit messages about race is a much more subjective—though no less rewarding—process, one that entails more contestation about the elements designated as "racial" text. If the textbooks were not already so rich in explicit lessons on race, analysis of their implicit contents would be indispensable. As we shall see, however, biology texts are replete with overt references to the concept of race that are likely to have an immediate and powerful effect on readers' understandings of human difference.

RACE IN BIOLOGY TEXTBOOKS, 1952–2002

A quick scan of American high school biology textbooks published since the 1950s seems to confirm Lieberman and Littlefield's conclusion about

their gradual disengagement from the topic of race. Whither the chapters entitled “Species and Races of Man” (Smith 1954) or the photographic collages of the world’s races (Gramet and Mandel 1958)? The impression that race has declined as a biology textbook topic is lent further support by the time trend in direct discussion—that is, passages that focus on the topic of race and use explicitly racial terms. While 92% of the textbooks published from 1952 to 1962 that I examined included such passages, only 43% of those published in the 1993–2002 period did so. (Overall, 56% of the textbooks sampled include direct discussion of race.) Moreover, word counts of the length of these race-related passages (not reported here) have fallen markedly over time.

Yet rather than undergoing a monotonic decline, as Lieberman and Littlefield concluded, race appears to be returning as a subject for discussion in biological instruction. The 43% share of sampled textbooks that included direct discussion of race in the 1993–2002 period represented an increase from their low of 35% in the 1983–92 cohort. Furthermore, indirect discussions of race in the context of medical disorders have burst onto the pages: no such passages existed in the textbooks published from 1952 to 1962, but fully 93% of the texts published from 1993 to 2002 contained such references. What then are the lessons about race that previous researchers have overlooked and that are driving a comeback in textbook presentations of race?

To understand the upturn in biology books’ engagement of race, it is necessary to “unpack” their content. Direct discussions of race can be disaggregated into three types:

1. *characterization* of race(s) by describing the variety of races or their attributes;
2. *definition* of the race concept;
3. *accounts* of the emergence or origins of racial groups.

Adding indirect discussion of race in lessons on disease, I describe each of the four principal types of biology-textbook race discussion below. In figure 1, I report what percentage of textbooks in each decade presents each form of race discussion.

Characterizing races.—Perhaps the most striking lessons that high school biology textbooks impart about race are found in their portrayals of the spectrum of human races. Not only have these descriptions been the most widely used form of direct racial discussion in the period under study, but they have also been among the most detailed and vividly rendered, thanks to the liberal use of visual illustration. To characterize races, biology textbooks offer accounts of which races exist, what their identifying traits are, and how races generally differ from each other. The most typical approach has been the verbal or visual taxonomy of races. Extremely frequent at midcentury—92% of the textbooks in the 1952–62

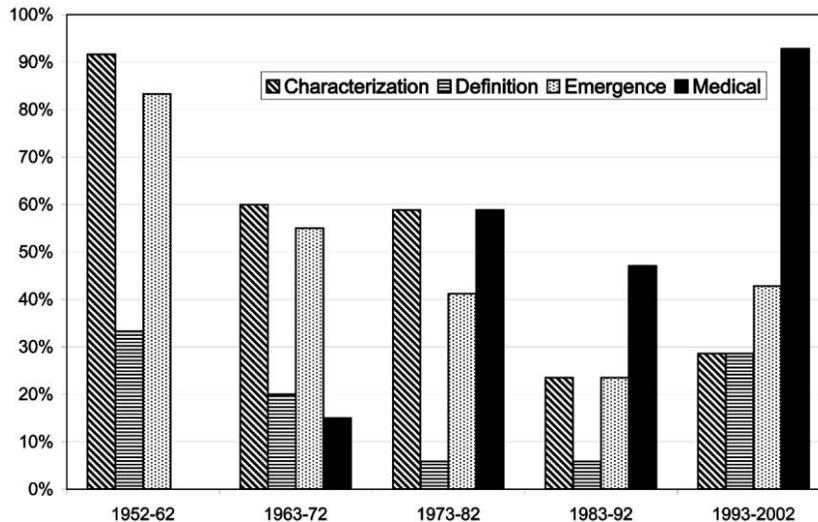


FIG. 1.—Principal components of racial discussion, 1952–2002; percentage of textbooks per cohort that include characterization, definition, emergence or medical accounts of race ($N = 80$). “Characterization” refers to passages about the number and characteristics of races; “definition” to statements defining the term “race”; “emergence accounts” are explanations of how races originated; and “medical” passages include brief references to race in their discussions of genetic disorders. Unlike the previous three components of direct, race-focused discussion, “medical” passages are a form of indirect discussion of race, where the focus is on human genetics, and race is only briefly mentioned.

cohort feature them—they are now quite rare; only 7% of the books in the 1993–2002 period present them. Changes in the taxonomies over time, coupled with the elimination of most, encapsulate the fundamental transformations in textbook racial pedagogy that took place in the late 20th century.

To illustrate the transformation of racial taxonomies, I compare three examples, separated by roughly 20-year intervals. Smallwood et al.’s (1952) *Elements of Biology* is typical of the early taxonomies for several reasons (fig. 2). First, it reflects the fairly complex scheme popular then, which posited broad “stocks” of mankind usually comprising about a dozen (sub)races. Second, it has a clear hierarchical order, with “Caucasians” at the top and “Ethiopians” at the bottom. Third, it includes a detailed typological chart (not shown) that permits identification of sub-races by such phenotypical features as hair, eye, and skin color. Finally, it incorporates the cultural component of dress as a meaningful clue to racial difference; the Nordic’s suit is juxtaposed with the head coverings, jewelry, and/or nudity of the lesser races. The contrast has a political



Nordic



Alpine

CAUCASIAN



Mediterranean



Hindu



Indian



Asiatic



Malay

MONGOLIAN



African



Oceanic



Pigmy

ETHIOPIAN

FIG. 2.—“The Races of Men” (Smallwood et al. 1952, p. 264)

overlay, whereby whiteness signifies both superiority and familiarity, and nonwhiteness indicates inferiority and foreignness.

Later taxonomies presented fewer races, not arranged in the same hierarchical order, without typological charts of phenotypical traits and with lessened reliance on clothing to indicate racial membership. The 1976 taxonomy shown in figure 3 follows a new organizing principle: whites and blacks—the main protagonists of racial struggle in the American imagination, particularly in the Civil Rights movement of that era—appear on the top row, wearing the same contemporary style of clothing. Here racial difference is not a matter of being native or foreign, but is implicitly acknowledged as existing within national boundaries. Underneath are the races that have historically been perceived as foreign (DeGenova 2006): here American Indians and Asians, both of whom were long excluded from U.S. citizenship, are positioned alongside Australian aborigines, inhabitants of a distant continent.

Today high school biology textbooks continue to use visual illustrations of human diversity, but they rarely do so by explicitly listing racial groups. The taxonomy found in *Holt Biology* (Johnson 1998) claims to portray “different racial groups, some of which are represented by the people above,” but does not tell the reader which races are being depicted, nor which have been excluded (fig. 4). This taxonomy is a notable departure from previous versions: now all the races are arrayed on an equal footing, their number is at a historical low of only four races, and it appears that a new Hispanic race has been ushered in (although the author’s intent is unknown in the absence of any specific race labels). In contrast to earlier textbooks, racial diversity is now understood as existing entirely within the boundaries of the nation and no longer need be signaled by distinctive dress. The traditional races that are least populous in the United States—notably Native Americans and aboriginal Australians—have fallen off the radar.

The evolving taxonomies point to three important dimensions of textbooks’ transformation over time with regard to race. First, whereas racial heterogeneity was originally associated with international variation, by the 1990s textbooks had come to depict racial diversity as an aspect of domestic American society. As we will see, this meant that ideas about racial difference would have to be reconciled with views of the U.S. population. Second, the whittling away of detail, from elaborate charts and lengthy passages to terse and relatively vague commentary, represents a retreat from the presentation of scientific evidence to bolster claims about race. Third, the near-disappearance of schemes that group races by features like skin and eye color suggests that textbook authors have all but discarded phenotypic classification.

In its place, the idea that races are demarcated principally by genetic

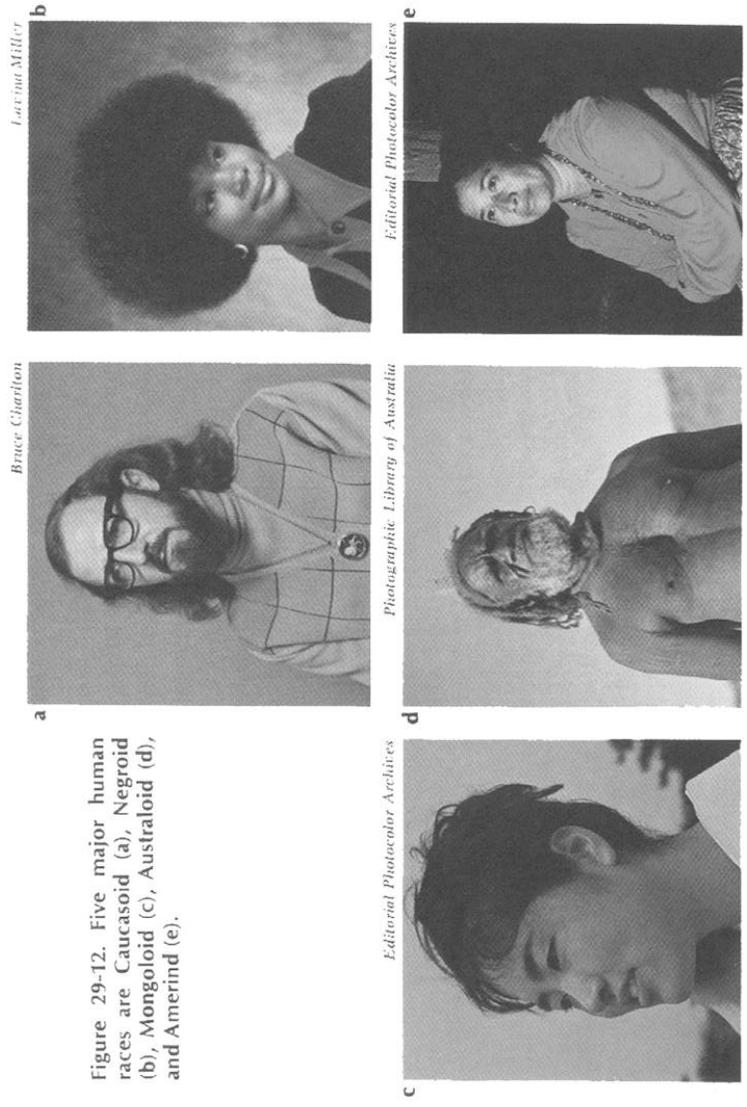


Figure 29-12. Five major human races are Caucasoid (a), Negroid (b), Mongoloid (c), Australoid (d), and Amerind (e).

FIG. 3.—“Five Major Human Races” (Oram et al. 1976, p. 614)



FIG. 4.—Different racial groups. The images appear over a heading: “Scientists disagree about how and when different racial groups, some of which are represented by the people above, evolved” (Johnson 1998, p. 226).

differences (which need not be visibly apparent) has become the dominant model of textbook racial pedagogy. The phenotype-to-genotype shift (Reardon 2005) is evinced both by the steady removal of the characterizations that depended most on a phenotypical, visual understanding of race—namely, taxonomies—and the growth in recent years of the one type of racial characterization to be recast in genetic terms: the verbal description of general racial markers (i.e., the types of differences to be found between races in general). For example, in 1976 one textbook maintained that “differences among races include structure of muscles, size of lips, and shape of nose” (Oram et al. 1976, p. 614). In 1998, however, Johnson wrote that “ecological races . . . differ genetically” (pp. 184–85). All three of the contemporary textbooks that identify general markers of race do so in terms of genetics, whereas in the oldest 1952–62 cohort, only one out of four did so; the others described general racial differences in phenotypic terms. More important, the move away from phenotype to genotype as the basis of race is apparent in all areas of the biology textbooks’ direct and indirect treatment of race.

Defining race.—Like the characterizing discussions of general race markers, definitions of race (i.e., statements that take the form “race is . . .” or “races are . . .”) have grown more popular in recent years after a period of decline (fig. 1). Also like the race markers, definitions of race have overwhelmingly come to adopt a genetic framework for explaining the nature of race. Older textbook definitions mixed references to genes with explanations of race in purely taxonomic terms (e.g., “a race is a subdivision of a stock”; Smith 1954, p. 490) and with vague references to “inborn physical characters” (Kroeber, Wolff, and Weaver 1960, p. 622) or “traits” (Morholt, Brandwein, and Ward 1972, p. 324) that would have been understood at the time in phenotypic terms. In contrast, four of the five definitions of race published in this sample since 1990 link it to genetic difference alone. Race also became more likely to be defined within passages devoted to evolutionary theory, so references to adaptation as the mechanism behind genetic differences between races begin to appear in the 1990s (for a sampling of definitions of race from across this research period see app. B, table B1).

Indirect reference to race in discussion of medical disorders.—Textbooks’ indirect discussions of race offer a final angle on their phenotype-to-genotype transition. When race comes up indirectly—that is, when it is explicitly mentioned in passages that are not principally concerned with the topic of race—it is usually in connection with lessons on human heredity, the stuff of genetics. As late 20th-century research findings on human genetics have made their way onto the pages of high school textbooks, however, race has become increasingly associated with one par-

ticular aspect of human heredity: the diseases that have been linked to genetic disorders.

Racial categories are now ubiquitous in textbook lessons on the mechanisms of genetic disorders. Sickle-cell anemia is routinely linked to “African-Americans” and cystic fibrosis to “Caucasians” (Biggs et al. 2002; Biological Sciences Curriculum Study 2002); “Jews of Eastern and Central Europe” (Raven and Johnson 2002) appear in connection with Tay-Sachs disease. Geographic indicators may be used instead (“The PKU allele is most common among people whose ancestors came from Norway or Sweden”; Biggs et al. 2002, p. 318), but often, geographic patterns of genetic disorders are reconfigured to fit racial boundaries. For example, few textbooks note that sickle-cell disease has evolved in malarial areas outside “black” Africa, and most expand the reach of Northern European-concentrated cystic fibrosis to render it a “white” disease. Tellingly, the linkage of Tay-Sachs to Jews in no instance leads textbook authors to describe it as a “white” disease like Scandinavian cystic fibrosis.

The linkage of race to genetic disorders has climbed sharply over time. From 1983–92 to 1993–2002, the share of textbooks using racial categories to explain the genetic roots of disease nearly doubled, from 47% to 90% (fig. 1). In the 1963–72 period, only 15% of the texts had done so. As genetic disorders have become better understood, racial classification has been a consistent feature of their textbook exposition—even though these diseases do not respect racial boundaries. This widespread, taken-for-granted connection of race-to-disease proclivity conveys the message that race is not only a useful concept for biologists, but one with grave and far-reaching consequences as well.

Accounting for race.—I return now to the last area of direct racial discussion—accounts of the emergence of races—to explore a different effect that the field of genetics has had on textbook race lessons. Explanations of how races came to be constitute a crucial dimension of textbook racial pedagogy; in the 1993–2002 period, textbooks were more likely to include a racial-emergence account than any other form of direct racial discussion (fig. 1), and these accounts drove the upturn in the share of textbooks presenting direct discussions of race.

After declining each decade since the 1950s, the proportion of textbooks accounting for racial development rebounded in the 1990s as texts increasingly featured the “multiregional hypothesis.” This theory of human origins proposes that each race in our species *Homo sapiens* descends from a different population of the extinct species *Homo erectus*, now generally thought to have emerged 1.5 million years ago. Each separate group of *H. erectus* would then have evolved independently into *H. sapiens*. The multiregional model is usually contrasted with the “Out of Africa” (or “recent single origin”) theory that *H. sapiens* evolved once, in

Africa, and thus all human beings are descendants of that original African group. Before the 1980s, the multiregional theory hardly figured in textbooks' racial histories, but by the 1993–2002 decade, 84% of the textbooks that offered emergence narratives presented it. Even books that do not explicitly address the origins of races describe it, so that almost two-thirds of the texts published from 1993 to 2002 outline the multiregional hypothesis.

The sharp growth in the popularity of the multiregional hypothesis raises two puzzling questions. First, not only is it a minority view in the scientific community (Gibbons 2001), but textbooks themselves often dismiss it even as they present it. Many authors designate the “African origin” story as “the generally accepted idea” (Nason 1965, p. 775); Raven and Johnson (2002, p. 489) conclude, for example: “By both these sets of evidence [Y chromosome and mitochondrial DNA], the multiregional hypothesis is wrong. Our family tree has a single stem.” Why then do so many textbooks report the multiregional hypothesis? Second, this version of racial polygenism—that is, the belief that the races stem from separate origins—is the product of a research stream spanning the 20th century, from Franz Weidenreich and Carleton Coon to Milford Wolpoff. Why then did it suddenly become prominent in high school textbooks in the late 1980s, especially at the moment when it seemed to have been decisively disproved? In 1987, a highly influential article, “Mitochondrial DNA and Human Evolution” (Cann, Stoneking, and Wilson 1987), presented a new analysis that convinced many scientists that *H. sapiens* originated entirely in Africa. Yet it was largely *after* the publication of this research that the multiregional theory was revived in high school texts.

The puzzle can be resolved with a simple metaphor: paradoxically, the multiregional hypothesis swept in on the coattails of the increasingly accepted Out of Africa theory. As textbooks introduced the African origin story advanced by Cann et al. (1987), their producers paired it with the multiregional hypothesis. A likely reason is that the hypothesis served as a counterweight to the potentially controversial suggestion that all human beings share African ancestry. Like the creationist objection to the evolutionary notion of kinship between “man” and “monkey,” the polygenistic multiregional account distances whites from ancestry shared with blacks.

The growing prominence of the multiregional hypothesis is another example of the mark that the field of human genetics has left on textbook racial conceptualization, if only by breathing new life into old debates about racial origins. It illustrates the “two paths” of racial conceptualization—essentialist and constructionist—that genetic research has simultaneously forged. In this instance, where new DNA analysis challenged traditional notions of racial difference by stressing shared African roots,

it also appears to have provoked a counterreaction in textbooks, which overwhelmingly resuscitated racial polygenism. Although the American Committee for Democracy and Intellectual Freedom exhorted textbook producers in 1939 to publish “the scientific truth on the subject of ‘race,’” nearly 70 years later no single truth has prevailed (ACDIF 1939, p. 614).

DISCUSSION: CHANGING LOGICS AND LOCI OF RACE

Over the last 50 years, American high school biology textbooks’ race content has changed considerably. While some types of racial instruction have fallen by the wayside, others have gained new currency. Specifically, phenotypic approaches like visual taxonomies and lists of surface racial traits have nearly vanished, while genetic accounts of race have proliferated. The net effect has been an increase since the 1990s in the proportion of textbooks presenting direct (and indirect) discussion of race. Clearly, the field of human genetics has left a deep mark on how textbooks present the concept of race to young people.

Yet the textbooks’ fundamental message about the nature of race has changed little. Of the two paths of constructivism versus essentialism, the overall impact of genetics has been to bolster, rather than challenge, the latter. Although fewer textbooks today aim to teach students directly about race—a development that might be considered indicative of a rejection of essentialism—most of them expose readers to the polygenistic belief that different races spring from different prehuman forebears (even if they do not endorse that idea), and almost all of them employ traditional racial groupings in unquestioned ways when discussing disease, heredity, and other topics. These routine uses of race render the occasional critique of essentialism ineffective. Genetic evidence is more likely to be marshaled to corroborate the existence of biological race than to demonstrate the opposite.

The renaissance in textbooks’ racial discussion, their geneticization of the race concept, and the continuity in their essentialism may all be interrelated. The genetic reframing of race has apparently paved the way for a revival in essentialist pedagogy after a post–World War II decline. Passages defining race (as well as those describing racial markers) point to this relationship: their U-shaped time trend coincides with their reformulation as matters of genetic difference (fig. 1). Geneticization appears to have lent racial essentialism new power and acceptability, and the textbooks’ content suggests it has done so by deflecting challenges to both the biological race concept and its proponents. In particular, genetic discourse solves two problems in post–World War II high school biology textbooks: (a) the disjuncture between discrete taxonomies and the phe-

notypic variety found in the population and (b) the tarnished reputation of race science.

In the second half of the 20th century, the United States' growing demographic diversity strained the phenotypical model of race. Recall that early textbook taxonomies strongly associated racial variation with international geographic and cultural difference: nonwhite people lived elsewhere and observed markedly distinct customs. Consequently, races were easily identifiable by the combination of their surface physical traits, dress, and practices. As textbook authors came to recognize that nonwhites lived within the national boundaries too, cultural differences in dress no longer signaled racial membership as neatly, and facial phenotype became the principal visual guide (fig. 3).

Just as racial difference became a domestic affair, however, the U.S. population diversified in several ways that led to much greater phenotypic complexity than early textbook writers had envisioned. First and foremost, immigration inflows have become more heterogeneous since 1965. No longer dominated by Europeans, most newcomers today hail from regions—like the Caribbean, Central and South America, South Asia and the Middle East—that Americans do not automatically associate with traditional “black,” “white,” “yellow,” or “red” color categories (Lee and Bean 2004). It is telling that the nation's largest minority, Hispanics, is a group about which consensus has yet to form as to whether it constitutes a “race” or an “ethnic group.” Second, rising rates of interracial marriage have also contributed to the appearance of phenotypes not easily categorized. Finally, multiraciality has received much greater recognition than in the past, a phenomenon that has both contributed to and benefited from the 2000 census's introduction of a “mark all that apply” race question. Multiracial people have been part of the nation since its inception, but rather than being accepted as such, they have largely been treated as members of single-race communities. Growing awareness of multiraciality contributes to the difficulty of maintaining a classification system based on phenotypical assignment to a handful of categories.

Geneticization makes racial sense of the new demographic landscape by relaxing the old phenotypic assumption that racial difference is visible difference. Even if we can no longer classify the widening range of physical types around us with ease, the genetic definition of race assures us that underneath the skin, racial types can be detected. This decoupling of race from surface phenotype preserves its viability as a taxonomic system in a nation that is becoming ever more diverse. In a multiracial America, genetic race is perhaps the most plausible kind of scientific race.

The difficulty of upholding phenotypical definitions of race in the late 20th century not only posed a logical challenge to the race concept itself, but it also threw into question the authority of those who espoused such

taxonomies. Thus textbooks' genetic framing also preserved racial essentialism by resolving a crisis of expertise in which phenotypic accounts had become mired. One problem was the lingering stigma of the eugenic era, despite textbook writers' efforts to portray phenotypic taxonomy as a "modern" or "scientific" approach to race by contrasting it with the conflation of race, nation, and culture and the belief in superior and inferior races that had marked earlier texts. The second, perhaps more urgent, problem for authors was the lack of scientific consensus on phenotypic taxonomy. In 1959, Baker, Mills, and Tanczos's *New Dynamic Biology* (Baker et al. 1959) pointed out the inconsistencies across different researchers' classification schemes, while Eisman and Tanzer (1972, p. 431) informed students that "there is no definite agreement about the number of races." Dissatisfaction with surface phenotype as an indicator of racial membership led textbook authors to feature blood type as a racial marker in the 1960s, 1970s, and 1980s. However, serotype did not lend itself easily to the broad color categories that textbooks continued to emphasize (Schneider 1996). The end result was a science of racial difference that seemed to wield only blunt tools and yield no definite answers.

In this context of waning scientific authority, the textbooks introduced genetic knowledge as the key to the definitive delineation of race. The prestige and cultural authority of the rapidly growing field directly addressed the weaknesses of the phenotypic race model: it promised new insights into human biology that were more accurate and sophisticated than those based on surface traits. However, the real advantage of genotypic over phenotypic accounts of race in textbooks has lain not in the advancement of new arguments, but in the shielding of scientific theory and evidence from public scrutiny.

Textbooks' genetic framing of race has preserved the authority of the essentialist notion of race by obscuring it, leaving it less accessible to potential critics. Applying a genetic model to race has meant translating the concept into a language that is still largely foreign to the layperson, making it unassailable by anyone outside elite scientific circles. Or, to use another metaphor, it buries the race concept under the skin so that it is no longer available to most for examination. Race goes from being a highly visible badge of surface phenotypical difference—one that even schoolchildren could grasp with simple charts—to being buried in our DNA and thus visible only to the expert in the laboratory. Who then can participate in the debate about the nature of racial categories?

Moreover, contemporary biology textbooks further "black-box" race (Latour 1987) by neglecting to provide supporting evidence for their confident assertions that races reflect patterns of genetic variation. Textbooks today define race as a matter of genetic difference, but exactly what kind of genetic differences these are, or what the signature genotypes of specific

racess are, is left to the student's imagination. For that matter, the genetically based "ecological races" (Johnson 1998) to which textbooks now refer are not named or otherwise labeled (fig. 4), so it is impossible to ascertain or question which races there are or how many. Nor is it possible to judge the bases upon which genetic races are delineated: What kinds of difference, and of what degree, signal the presence of a racial boundary? And perhaps most important, are these unnamed races the products of tabula rasa research into human DNA patterns, or do they correspond to socially predetermined groupings that have subsequently been shown to differ in some way? At issue is the difference between "extracting basic divisions of the human species" from biological data versus *imposing* such divisions (Marks 1996, p. 353). In today's biology textbooks, the question is never raised. The textbooks' silence on all these matters marks a retreat from the detailed expositions that the old phenotypical typologies once boasted—and which ultimately proved to be their undoing.

In the last 50 years, high school biology textbooks' recasting of race as located primarily in genetic rather than phenotypic difference has bolstered both the idea of biological race and the authority of its adherents. It has reconciled long-standing ideas of difference to a changing social landscape and assured readers that new scientific expertise supports these traditional beliefs. In so doing, the textbooks have reasserted the primacy of biological science as a source of knowledge concerning the nature of racial difference.

CONCLUSION: ENDURING RACE

Geneticization is the latest episode in a much longer history of transformation in race science, and one that is not limited to textbook pedagogy. It exemplifies—and sheds light on—an ongoing pattern where authoritative accounts of racial difference are regularly rejected in favor of new models. Placed in broader historical context, the empirical textbook findings described above illuminate what is a puzzling relationship between racial essentialism and science. Understanding this relationship is of central importance because it underpins the racial ideology that has so deeply shaped our system of social organization.

Since the nation's founding, everyday Americans as well as famous citizens like Thomas Jefferson have assumed that science could provide conclusive knowledge about human races (Smedley 2007). Scientific claims about race have played a major role in policy debates about slavery, immigration, integration, and other matters. In short, essentialist belief in deep-seated and fixed racial differences has relied heavily on claims of scientific veracity.

Yet for all its apparent dependence on scientific rationale, the biological race concept has demonstrated a curious autonomy from science. For one thing, scientific findings that contradict widely held beliefs can be discarded. For example, the early 20th-century anthropological classification of South Asian Indians as Aryans did not ensure that American courts ruled them Caucasian and thus entitled to citizenship via naturalization (Haney López 1996). More important, scientists' refutation of the fundamental arguments upon which race has rested has not led to a decisive rejection of the biological race concept. The scientific predictions that blacks would be unable to survive outside slavery or mulattos would be unable to reproduce have not been borne out. Theories of major racial differentials in crania and other skeletal attributes have been disproved (Gould 1996). Racial boundaries have been found in neither blood type nor anthropometric statistics (Schneider 1996). And although the debate has now moved on to whether genetic analysis reveals racial patterns, some earlier expectations have already been clearly overturned. There is no "race gene" that dictates a person's race; there are no alleles (genetic variants) that are shared by all members of a single race and not by members of any other (Marks 1995). Given these successive upsets of the prevailing grounds for a biological model of race, why has it not been discarded?

The historical record shows that when racial essentialism comes under attack, it survives by making its way to newer and more authoritative areas of inquiry (Young 1995). When refuted in one field, the race concept migrates to higher ground, where evidence for racial difference is inevitably sought and found. When the Bible was the ultimate guide to the natural world for most Americans, the origins and nature of racial difference were to be found there. As the Bible lost its broad explanatory authority, race was revealed by the burgeoning sciences of biology and anthropology. Once anthropometric measurements of skull size and brain weight became suspect, proof of racial division was found in IQ tests and blood type. Today, DNA offers the most compelling evidence. Belief in physical racial boundaries has been maintained over time through an ongoing process in which racial difference is corroborated by—and gives impetus to—the most respected scientific techniques.

Against this historical backdrop, the study of textbooks addresses an important theoretical question: How is the transfer from one ground of authority to the next accomplished without casting into doubt the scientific veracity of race? In other words, why does the loss of validity in one scientific field not prevent the race concept from finding a new home in another? Textbooks suggest that the challenge of disconnecting from one field and connecting to another—a problem of articulation (Wuthnow 1989)—is met in two ways. First, the claims at stake are recast (e.g., from

phenotypical to genotypical phenomena). Second, the reformulated logic is accompanied by rhetoric that privileges the new science vis-à-vis the old.

The textbooks I examined also reveal that new empirical evidence is unnecessary for change in racial rationales, unlike the classic “paradigm shifts” (Kuhn 1996) in which new findings lead to the rejection of old ideas. In the texts, race has become a matter of genetic difference in the absence of any demonstration of the genetic nature of race, such as markers or types. There is only the assertion that races “differ genetically” (Johnson and Raven 2001, p. 293). It becomes clear then that race has not been recast as genetic because that approach proved more accurate or informative than anthropometric measurement. Although textbooks identified the lack of scientific consensus on a single taxonomic scheme as a weakness of the phenotypic model, the new genetic lessons on race have hardly resolved that issue; they shy away altogether from listing or numbering the races that they claim DNA analysis discerns. Instead, textbook race seems to have become genetic because the field of genetics carries prestige that compensates for the flaws of earlier biological models of race, and it has yet to be used consistently to refute the race concept.

Without close examination of textbooks—of the way that race is constructed as a natural phenomenon for mass consumption—we might conclude that geneticization simply reflects improved understandings of the biological mechanisms of racial differentiation, and therefore that a tight link binds race theory and science. Instead, however, the articulation between the two must be loose enough for race to gain the luster of scientific authority without the constraints of material evidence (or occasional scientific critique). In this way essentialist racial ideology retains the malleability necessary to structure social organization in continually changing contexts.

Race is continually remade, and it is being refashioned today, as genetic genealogy tests, race-targeted pharmaceuticals, and high school textbooks make clear. When the race concept has been challenged—whether by the post-World War II stigmatization of race science, the Civil Rights upset of long-established racial hierarchies, or late 20th-century demographic diversification—Americans have reworked and thus preserved it, often by recalibrating its relationship to science. To fully understand the role of race in the United States today, sociologists must be attentive to this ongoing, contemporary process of reconstruction and bring to the study of racial conceptualization and its legitimation the analytical lens they have applied more readily to issues of race relations, attitudes, and classification. The efforts we make as a society to reformulate and maintain the race concept testify to its enduring social role as a tool for structuring and interpreting the world around us.

APPENDIX A

Investigation of Subsample Differences

In terms of general characteristics, I compared the three subsamples—labeled “TC” (Teachers College), “HS” (New York City high school), and “LIST” (state adoption list)—according to (a) authorship, (b) edition series (i.e., whether a subsample contains an earlier or later edition of a text included in another subsample), (c) publisher, and (d) coverage of evolutionary theory (i.e., inclusion of chapters or units devoted to “Evolution,” “Natural Selection,” etc.). Analysis of authorship and edition reveals that 34% of the textbooks have a counterpart in another subsample that was written by the same author and/or is a different edition (earlier or later) of the same book. This suggests a significant degree of similarity between subsamples (particularly between the TC and HS collections). Second, regardless of source, the textbooks issue from similar groupings of publishers, once the remarkable consolidation of the industry is taken into account. The two older subsamples (i.e., TC and HS) derive from a wider spectrum of publishers, both because they contain more books and because the publishing industry itself had many more independent presses prior to the wave of mergers and acquisitions that took place beginning in the 1970s. However, if the older imprints are traced to their present-day incarnations as divisions of larger conglomerates, 66% of the books in the Teachers College subsample and 65% of those in the high school subsample were published by the same units that produced the books represented in the current state adoption subsample. Although shared publisher is no guarantee of similar content, the opposite would be a troubling indication of markedly different subsample characteristics.

Exploring whether the subsamples differed in their approach to evolutionary theory yields the strongest indication of their similar representativeness of the target population. Although Skoog (1992) reports that “the emphasis on selected topics concerned with evolution was reduced or eliminated in many textbooks” in the 1970s and early 1980s, the textbooks analyzed here, selected because they represent the most widely used texts, are nearly uniform in their inclusion of evolutionary material, regardless of their subsample origin. In the decades of greatest subsample overlap (1973–82 and 1982–1993), 100% of both the TC and the HS samples include lessons on evolution.

To investigate whether the subsamples paint conflicting portraits of textbook trends in race discussion (i.e., the dependent variable), I compare them on two measures. The first is straightforward: whether or not a textbook includes the term “race” (or historical synonyms like “stock”) in its index pages. The second measure is one that I call “characterization”; it refers to whether a textbook lists or illustrates the traits of specific races.

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Because the only significant overlap between subsamples occurs in the 1973–82 and 1983–92 cohorts, which combine TC and HS texts, the analysis is limited to these decades and samples. On both measures, the two subsamples reveal the same downward trend over time. In both cases, however, the drop is more pronounced in the TC subsample than in the HS one. The percentage of TC textbooks including the term “race” in the index falls from 58% to 0% over the period under study, while the rate for HS books drops from 40% to 25%. Similarly, the share of texts that visually or verbally “characterize” races decreases from 67% to 13% in the TC subsample, and from 40% to 33% in the HS group. The differences in their exact levels are not statistically significant, however, given their small numbers.

APPENDIX B

TABLE B1
DEFINITIONS OF RACE IN BIOLOGY TEXTBOOKS

Year	Definition	Source
1954	In biology, then, a race is a subdivision of a stock and a stock is a subdivision of a species.	Smith 1954, p. 490.
1954	Within a species there may be even smaller divisions called races or varieties.	Whaley et al. 1954, p. 335
1958	The biologist thinks of a race as a group of people with definite traits that are passed on by heredity—that is, through genes. We may say this another way, namely, that the members of a race have many genes in common.	Gramet and Mandel 1958, p. 577
1960	Race: in the classification of man, a subdivision of a stock; composed of people who tend to have certain inborn physical characters in common, such as Nordic and Hindu races.	Kroeber et al. 1960, p. 622
1963	Racial groups are types or stocks of this single species.	Moon et al. 1963, p. 421
1965	Races consist of particular populations within a species which differ to a small extent in genetic composition.	Nason 1965, p. 338
1972	A race is a population that differs from other populations in a few genes.	Eisman and Tanzer 1972, p. 431
1972	When people have many of the same traits, we sometimes say they belong to a race of people.	Morholt et al. 1972, p. 324
1976	Human races are subspecies of <i>Homo sapiens</i> .	Oram et al. 1976, p. 621
1990	In a species as numerous and widely dispersed geographically as <i>Homo sapiens</i> , it is only natural to expect genetic differences to have arisen among populations, and the product of adaptation to different environmental pressures was the formation of subspecies, known popularly as races.	Hopson and Wessells 1990, pp. 861–62
1998	Ecological races are populations of the same species that differ genetically because they have adapted to different living conditions. Members of ecological races are not yet different enough to belong to different species, but they have taken the first step.	Johnson 1998, pp. 184–85
2000	Race is a biological term that describes genetic groupings of animals, including humans. For example, a race of sparrows may have different feather patterns than others of its species.	Strauss and Lisowski 2000, p. 292
2001	Over time, populations of the same species that differ genetically because of adaptations to different living conditions become what biologists call ecological races. Although the members of different ecological races are not yet different enough for the groups to be called different species, they have taken the first step toward speciation.	Johnson and Raven 2001, p. 293
2002	Within the units classified as species, populations that occur in different areas may be more or less distinct from one another. Such groups of distinctive individuals may be classified taxonomically as subspecies or varieties (the vague term “race” has a similar connotation, but is no longer commonly used).	Raven and Johnson 2002, p. 458

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