ness superimposed by major episodes of population growth like the Bantu, Han, or European expansions? This is an empirical issue, not an ideological issue, but the reader would never understand that from this book. On page 163, for example, there is the remarkable assertion that anthropological genetics was developed *"in order to* validate racial categories" (emphasis mine).

Similarly, the idea that biological differences among groups have anything to do with social inequalities among groups is identified throughout as pernicious, dangerous, and wrong. But surely this too is an empirical issue, and any political or moral implications are in the mind of the implicator, not in the answers themselves. Are Europeans greedy? Are Jews natural pugilists? Is love of slaughter the mark of an English gentleman? (These hypotheses come, respectively, from Leonard Jeffries, Jonathan Marks, and Marty Feldman.) These are not very interesting questions, because there is no theory about any of them, to my knowledge, but at least in principle they are amenable to empirical investigation.

I am happy to have Marks or anyone discuss the political implications of one view or the other. I am not so happy with the idea that I have to censor my investigations so that the results align correctly with my politics or those of anyone else. I do not for a moment believe that scientific fashion *causes* political fashion. For example, I can walk into any mall bookshop, ask about IQ, and be handed a book by Stephen Jay Gould, but not a book by Arthur Jensen or Richard Herrnstein. Gould writes what Americans want to hear, while Jensen and Herrnstein's works are not welcome. Even so, there is an intellectual fad that claims that most science is politically motivated and that imputation and analysis of these motivations is a worthy scholarly enterprise. This mostly amounts to calling people racists. The prospect of it all is that we may find the English department at our universities in charge of research policy if they don't find a new fad.

All of these books are well worth reading. For those interested in the history of the study of human diversity, I recommend the Shipman book. Although Marks' book may provide some different perspectives, I frankly don't trust it because of its ideological cant. For example, Shipman's description of the reception of Carleton Coon's *Origin of Races* is fair, evenhanded, and accords with my own knowledge of what happened, whereas Marks' narrative about the same events does not ring quite right to me.

The Bell Curve is dull reading, but the information it presents is centrally important to a lot of people in business, education, and government. Anyone familiar with the literature on testing will recognize what has been well known for decades, supplemented with new tabulations from the NLSY database. Rushton's book, on the other hand, is anything but dull. Some of it is, I think, far-fetched, like some of his genetic similarity theory and some of his account of ecological theory, but it should not be shouted down and dismissed.

Henry Harpending
Department of Anthropology
College of Liberal Arts
Pennsylvania State University
University Park, PA 16802-3404
hxh5@psu.edu

Race, Reason, and Rationale

Race has been a core concept in anthropology since the inception of the discipline. For the last century, anthropologists have grappled with the problem of racial analysis with little success. Now, at a time when race has been abandoned by 50% of biological and 70% of cultural anthropologists,[1] four books have emerged to renew interest in its value and use as a tool for scientific research on human diversity. These books address issues of race and racial classification in different ways, from different perspectives, and with different agendas.

Pat Shipman and Jonathan Marks deal with the history of race and the study of human diversity. Although both authors examine the scientific and political factors in the study of biodiversity, they reach disparate conclusions. J. Philippe Rushton uses a life-history approach in which reproductive adaptive strategies of races are seen as driving evolutionary changes in morphology and behavior. These reproductive differences define races and allow us to rank order them. Richard Hernnstein and Charles Murray's contribution is more narrowly focused on the impact of intelligence quotient on race and class. They see racial and class differences as being deeply imbedded in immutable, genetically determined measures of intelligence. This interpretation has become an important part of the public policy debate that is at the heart of political decisions being made in the United States.

The questions about race and its role in understanding human biodiversity are not trivial. As the philosopher N.W. Pirie[2] noted, the answers to such questions are indispensable:

> Some people think that the philosophy a scientist accepts is not of very much importance; his job is to observe the phenomena. This is a gross oversimplification and it involves the subsidiary hypothesis that all scientists are fully equipped with serendipity. A sensible philosophy controlled by a relevant set of concepts saves so much research time that it can nearly act as a substitute for genius.... A scientist can have no more valuable skill than the ability to see whether the problem he is investigating exists and whether the concepts he is using are applicable (p. 280).

Pat Shipman begins her discussion of the evolution of race and racism by recounting Darwin's contribution to evolutionary theory. She neglects any discussion of contributions from the previous century, during which race gained scientific and political prominence. Shipman does not extensively discuss the definition, history, development, or evolution of race or, for

that matter, provide an analysis of racism. A serious treatment of the history of race would have to consider its origin as an inherently folk taxon in which "pure" races were divinely ordained. The pre-evolutionary classifications were typological and immutable and had a deeply imbedded racist foundation. In Linneaus' original classification, for example, Native Americans were described as a group having reddish skin and a choleric temperament who paint themselves with fine red lines and are regulated by custom; Africans were described as a group having black skin, silky hair, and flat noses, who are phlegmatic, relaxed, indolent, and negligent, who anoint themselves with grease and are governed by caprice. The fascinating story of how race classification and its innate racism have responded to evolutionary thought and an emerging synthetic theory of genetic evolution is missed in this book. The concept of race has a chameleon-like quality that allows it to change its color to fit into a changing intellectual climate. The concept may look different at different times, but it's still the same creature.

Shipman's interpretation of the evolution of race and racism begins with the retelling of Darwin's writing of *The Origins of Species* and the controversy that ensued. Shipman details the response of scientists in England, the United States, and Germany. She describes the fortuitous partnership forged by a plodding Darwin and a dynamic Thomas Huxley (her characterizations) "that gave evolution life." In Germany, the conflict between Haeckel (Darwin's "noble knight errant") and Virchow set the course of science in that country. The Monist Haeckel emerged as the victor and set the stage for the politicalization of science, the reformation of the educational system, and the establishment of eugenics laws that eventually changed the course of history.

A key element in Shipman's analysis is the controversy that, in the early 1950s, centered on the framing of the UNESCO statement on race. The politics of the first UNESCO statement are well known, but the professional jealousy and infighting that ensued have not received as much attention. The protagonist, in Shipman's eyes, is Ashley Montagu, who is generally acknowledged as the author of the first draft of the statement. The UNESCO statement is a confusing document that provides a definition of race, a tripartite classification of race, and a refutation of the race concept, which is said to be "less a biological phenomena than a social myth." Emphasizing Montagu's political motivation, Shipman overlooks any scientific reasons for rejecting race. Instead, she portrays Montagu as a man whose Jewishness seems to have impelled him to subvert science for the politics of equality. The first draft of the UNESCO statement was rejected after a series of bitter exchanges and accusations among anthropologists from around the world. Subsequently, a new committee was formed, which, in turn, had its own set of problems. The debacle that ensued with the UNESCO statement and its revision is a lesson that Shipman says should teach us something. Alluding to the UNESCO fiasco and the committee's 1993 rejection of a statement on race by the American Association of Physical Anthropologists (I was a member of the ad hoc committee that drafted the statement), Shipman advises: "Let us hope that those who are ignorant of history are not condemned to repeat it. Let us hope that something has been learned about civility and tolerance" (p. 222). In 1994, the executive board and the section assembly of the American Anthropological Association passed a resolution stating, in part, "that differentiating species into biologically defined "races" has proven meaningless and unscientific as a way of explaining variation (whether of intelligence or other traits)...." A Center for Disease Control and Prevention[3] workshop in 1993 (again I was a participant) came to similar conclusions. This is not an issue of civility and tolerance, but of scientific validity and usefulness.

In Shipman's story, the tragic hero is Carleton Coon, whom she sees as "a man betrayed by history." Coon was a leading figure in physical anthropology and one of the foremost proponents of racial analysis. She implies that, among anthropologists, only Coon had the intellectual backbone to resist political pressure with respect to race. She portrays Coon's fall from prominence as having been, in large measure, the result of political attacks by his colleagues. Shipman's sympathetic portrayal of Coon presents him as a charming individual with a rakish sense of humor. Nevertheless, he comes across as one pursuing an eighteenth-century agenda—race—with a nineteenth-century approach. Despite his confused efforts to relate his work to evolutionary synthesis, Coon did not understand why that work was not well received in the last half of the twentieth century. Shipman argues that the forces that transformed the anthropology of race are long-standing and came in response to the politicizing of Darwinian evolution by the Nazis. According to Shipman, the evolutionary biologists of the 1950s and 1960s "opposed to this distortion responded, not by depoliticizing Darwinism, but by bending it to the cause of antiracism" (p. 174).

It is the reaction to Coon's work by scientists such as Dobzhansky that most seriously undermines Shipman's view that Coon's studies were rejected for political rather than scientific reasons. Shipman comments (p. 190), "But for Washburn, Dobzhansky and Montagu, there were issues of racial differences that were better left unexplored, because such data might be misused by those who believe that racial groups could be defined in a consistent manner." Although that may have been true for Montagu and Washburn, it is unlikely that Dobzhansky can be included in this group. He[4] (1968, p. 166) argued,

> To deny the existence of racial differences within human species is futile... I find it amusing that those who questioned the validity of racial classifications have themselves used the word "race" or the term "so-called race," many times. Indeed, how else could they speak about human variation at all!

What is missing from Shipman's book is an analysis of the substantive criticisms of racial analysis. In her view, criticism of race is politically motivated and therefore not worthy of mention. Shipman ends *The Evolution of Racism* (p. 271) with the admo-

nition that "as a species, it's time to grow up." Although it is not entirely clear what she wants us to do, I assume that she is arguing for us to look at human variation and attempt to understand what it means. This is indeed a noble undertaking. However, as many decades of research have demonstrated, the use of leftover concepts of race are more of a hindrance than an asset in the scientific study of human variation.

Jonathan Marks provides a more compelling treatment of the history of race. He begins by contrasting Linneaus' interest in pattern with Larmarck and Buffon's concern for process. This opposition, which Marks calls "a duality of thought," is a theme that continues throughout his discussion of how variation is interpreted. According to Marks, Darwin provided the synthesis that bridges pattern and process. Even though the theoretical bases were in place, a unified biology with a synthetic theory of evolution did not develop until the middle of this century.[5] Effectively using this theme, Marks discusses the evolutionary history of the species by examining the basics of biology (reproduction) and both microevolutionary and macroevolutionary change. He moves from such topics as meiosis to the evolutionary history of the species (the fossil evidence).

The conflict in the duality of thought continued until the 1960s, when it was brought to a head by Carleton Coon's publication of *The Origin of Races*.[6] Paralleling the duality of thought between pattern and process was an evolutionary perspective that tied culture to biology. Race was the tool for ranking groups in terms of their biology and, consequently, their level of cultural development. Using the Great Chain of Being in the preevolutionary period and then differential evolution after Darwin, races and culture were inextricably linked. Thus, the history of biology and the biology of history became the same. Although we may think this link was broken with the contributions of Franz Boas, Marks (p. 75) quotes Carleton Coon[6] on this point:

> (I)t is a fair inference that...the subspecies which crossed the evolutionary threshold into the category of *Homo sapiens* the earliest have evolved the most, and that the obvious correlation between the length of time a subspecies has been in the *sapiens* state, and the levels of civilization attained by some of its populations may be related phenomena (ix–x).

(As we will see, this remains a key concept in the world view of J. Philippe Rushton.)

Marks clearly states the case against race. According to him, it is not just the misapplication of race by racists for political gain but the scientific foundation of the concept that is at issue. Race is a social construct that is of little use in understanding human biovariability. There is ample evidence to show that social, political, economic, and cultural factors mold racial classifications. In the United States, Marvin Harris[7] described the social practice of hypodescent by which individuals of "mixed racial heritage," regardless of the extent of admixture, are invariably assigned to the race that is considered to belong to the lower socioeconomic group. In its most base and vulgar form, a "drop of Negro blood" is all that is needed to determine placement in a racial group. As Marks points out, two individuals with the same phenotype will often be placed in different races according to the language they speak. Magical potions were touted that would reveal individuals' race and religion from their blood. In 1927, the American Journal of Physical Anthropology published a study by E.O. Manoiloff[8] in which it was stated that chemicals added to blood could distinguish Jewish, Asian, Korean, and Kirghiz blood (p. 126). Racial classifications tell us more about society than they do about biology.

Much of what Marks has to say about the shift in paradigm during the 1960s rings true to me. However, I would have liked to see more emphasis placed on the impact that the accumulation of genetic information had in making racial analysis problematic, which Marks gives a secondary role. I was a student at the University of Michigan in the 1950s, when William Boyd's[9] *Blood Groups and the Races of Man* was the "bible" of anthropology and its author considered the savior of racial studies. Blood groups were "non-adaptive," immune to prejudice, and could be easily manipulated by mathematical analysis. However, many of us became disillusioned and found Boyd's analysis to be typological and lacking insight. Marks accurately points out (p. 132) that as Boyd and others incorporated more and more genes into their analyses, differences between races increased in what Marks calls an infinite regression. Classifiers had to give up the classification or pick and choose the genes that reflected their preconceived notion of race. In 1958, Frank Livingstone published his study of the relationship of malaria, sickle cell traits, and agriculture.[10] It was apparent that sickle cell viewed as a racial trait obscured an understanding of its role in adaptation. For many of us within this intellectual climate, arguments about the differential evolution of race lacked importance. When Livingstone[11] published his criticism of racial analysis, many ears were eager to hear the message.

Marks discusses human diversity in light of modern genetics. He shows how race is used in a number of different settings and how the use of genetic and morphological variation and the analysis of DNA undermine racial analysis. (This point was brought home to me by one of my students. Society classifies him as African-American, but by mitochondrial DNA analysis he is classified as European because his mother is German.) Racial classification as a meaningful unit of biology is doomed to failure because human variation is not neatly packaged in races.

Does a criticism of race suggest a lack of interest in human variation? Certainly not. Marks closes his book with chapters on the analysis of the adaptive nature of variation, health and human variation, traits that define humans, gene interaction, and human behavior. He displays an enthusiastic interest in human biodiversity and effectively shows that this biodiversity is amenable to investigation without racial analysis. Clinical variation provides a powerful method for analyzing variability. Although *Human Biodiversity* is not the easiest book to read, your time and effort will

be rewarded with an insightful, informative, and interesting interpretation of race, history, and human diversity.

Rushton's *Race, Evolution and Behavior* offers little that can be considered redeeming scientific value. The book presents a type of advocacy research that defines its conclusions and then sets out to accumulate the data to support them. It is what has been called the "I wouldn't've seen it if I hadn't believed it" approach to research. Rushton modestly sees his efforts as revamping social sciences (chapter 1) by an analysis of character traits (chapter 2) and behavioral genetics. Race is his primary method of analysis and, to his credit, he defines it and responds to his critics who claim that race is not an acceptable method of analysis. He accepts the argument that race is a social construct, but claims that, for his purposes, social and biological race are essentially identical. Furthermore, he argues that if the forensic anthropologist can make a racial assessment from a skeleton, biological races must exist. He asserts that blood protein and DNA support racial analysis, but he does not consider arguments that traits do not cluster neatly into racial groups.

Rushton links his analysis of racial differences to evolutionary change. In his model of differentiation, races can be placed on a continuum with respect to 60 variables. The polar ends of the spectrum are occupied by races of East Asian ancestry ("Mongoloids/Oriental") and African races ("Negroids, blacks"); those of European ancestry ("Caucasoid, whites") are in an intermediate position. The 60 variables are included in matrices such as brain size (endocranial volume, external head measurements, cortical [cerebral] neurons), intelligence (IQ, decision time, cultural achievement), maturation rate (gestation time, skeletal development, motor development, age of first intercourse, age of first pregnancy), personality (activity level, aggressiveness, impulsivity, sociability), social organization (marital stability, adherence to law, mental health, administrative capacity), and reproductive effort (twining, hormone levels, size of genitalia, secondary sex characteristics, frequency of intercourse, and sexually transmitted disease). Using *r/K* selection framework, Rushton develops a "differential *r/K* theory" in which "r" populations maximize reproductive potential and "K" selected groups emphasize parental investment.

In light of differential evolution supported by the "out of Africa hypothesis," he argues that an African/non-African split occurred 100,000 years ago, whereas the Mongoloid/Caucasoid split emerged 41,000 years ago. The African races were the earliest to emerge and are the most *r* selected. They remained in a benign environment that did not challenge them. Races that were the latest to emerge (Mongoloid/Caucasoid) faced a harsh and more cognitively demanding environment and are therefore the most *K* selected. Given the fact that *r/K* theory is a controversial concept when applied at the species level, Rushton's application of it to subspecies and individuals is unprecedented. Rushton also uses Coon's differential evolution models to argue the historical validity of *r/K* theory. It is ironic that Rushton's theory is the converse of that proposed by Coon, who suggested that the earliest races to have emerged (Asians and Caucasians) were exposed to civilization longer and were therefore more advanced.

In its simplest form, Rushton's proposal is that if you are *r* selected you put relatively more energy into your reproductive organs and consequently sacrifice other adaptive features. In an interview reported by Miller, Rushton said, "Even if you take something like athletic ability or sexuality—not to reinforce stereotypes or some such thing—but, you know, it's a trade off: more brains or more penis. You can't have everything."[12]

In an argument that is stated without any theoretical support, Rushton claims that a genetic basis for ethnocentrism explains racial and ethnic conflict. It is human nature, according to Rushton, for people to give preferential treatment to those who genetically resemble themselves. Using what he defines as "genetical similarity theory," which is an extension of altruistic behavior, kin recognition, and inclusive fitness, he argues that people who resemble each other are likely to be genetically similar. To support the genetic basis of similarity theory, Rushton (p. 82) used advertisements to recruit 67 pairs of friends. He found that they were 54% similar in 10 blood group alleles, whereas random pairs were only 48% similar.

Rushton provides an encyclopedia of the latest in racist thought coated with a veneer of science. For example, he "updates" the latest evidence of a link between race and civilization with reference to John Baker,[13] accounts of missionaries, and the travels of David Livingstone[14] published in 1857 (p. 99–100). To support his belief that some races are inherently more "law abiding" (p. 157–160), he defines nations racially (Negroid, Mongoloid, and Caucasoid) and compares crimes per 100,000 people. Rushton (chapter 8) declares that AIDS can be understood in terms of *r/K* reproductive strategy of the races. Accordingly, Negroid/black races are more susceptible to AIDS because they are more *r* selected. Reflecting what seems an obsession with penis size, Rushton analyzes ethnographic data on penis size and even provides the latest WHO specifications for condom size. According to Rushton, penis size and other measures of sexual potency (i.e., frequency of intercourse, permissive attitude, and low guilt) naturally propel these races to the highest frequency of AIDS.

Pursuing his other obsession, intelligence, Rushton (chapter 6) uses brain size, IQ testing, decision time, and cultural achievement to make his case for racial differences in cognitive ability. For example, he summarizes 43 studies that show statistically significant differences in cranial size in different races. In response to a criticism by Tobias regarding sampling and problems in controlling for the extraneous variables (body size), Rushton (p. 132) states "there is no special reason to believe that they are systematically in favor of one race over another." Of the 43 studies reported, 10 were completed prior to 1900, 12 between 1900 and 1925, 11 between 1925 and 1950, three between 1950 and 1975, and eight (two of them by Rushton) since then. Those studies completed before the 1950s were performed during an era in which prior assumptions of racial dif-

ferences were often givens.

Is this science? Not by my standards. I am puzzled that some of my anthropologist colleagues find Rushton thought-provoking in a positive way. Given the problems with racial analysis, the amount of variation apportioned to race, and Rushton's misapplication of evolutionary theory (*r/K* selection), how can we consider this to be science? Do we really want to argue with Rushton whether or not a group that has been exposed to harsher environmental elements is more *K* selected than another and therefore should have a higher IQ? Are we going to find Rushton more scientific if he develops an index of brain volume to penis size, shows that it is statistically significant and correlates with cultural achievements, and then provides a graph to support his data? I argue that science, whether it is biological, social, or geological, involves some form of hypothesis testing. Even with historical data, it is possible to test hypotheses using what J. R. Platt[15] has called "strong inference," a method that involves the falsification of multiple hypotheses. What we see in Rushton's response to criticism is the compiling of more and more highly selected data to support his conclusions. I am not impressed with that mass of data and do not see it as science. If you examine the text, tables, and graphs, you will find that old-fashioned racism has simply been repackaged in the "data" and language of science.

The Bell Curve, by Hernnstein and Murray, is a "slick" discussion of the relationships among IQ, class, and ethnicity. There are few books of this length (845 pages of text, 57 pages of bibliography, 108 pages of notes, and 100 pages of appendices) that can be described in this way. The "slickness" is evident in the sale of 400,000 copies of a $30 book despite its size and complexity. The authors are sending a message that people want to hear. Hernnstein and Murray declare, "Trying to eradicate inequality with artificially manufactured outcomes has led to disaster. It is time for America once again to try living with inequality..." (p. 551). Furthermore, they say, we—individually or as a nation—can do little about it. The emergence of a "meritocracy" that is genetically driven dooms any effort at social or political solutions.

The Bell Curve is written in a way that encourages its reading at a number of levels. Hernnstein and Murray state that their argument can be understood by reading their italicized précis (about 30 pages), which is not encumbered by any evidence or technical terms (one critic described it as a section for the "cognitively impaired"). If you are able to read the science section of newspapers, they suggest that one read the main sections of the chapter. For the scientific evidence, they suggest that one dig through the seven appendices. I felt as if the authors were sitting in front of me waving a briefcase that contained the truth.

A great deal of information is well presented. The evidence that the United States is a meritocracy with an emerging cognitive elite is well supported. Using data derived from the National Longitudinal Survey of Youth, they examine the partitioning of cognitive ability in race and class. The disparity in economic resources that Hernnstein and Murray describe is not debatable and, indeed, continues to widen. In April of this year, the New York Times[16] reported that 1% of Americans control 40% of the nation's wealth and that the wealthiest 20% control 80% of the resources. What is at issue is the cause of this disparity and the inability or unwillingness of the nation to do anything about it.

According to Hernnstein and Murray, disparity in social and economic status has a genetic foundation. They believe that IQ is the best measure of intelligence and that it has a genetic basis. Following this reasoning, they accept Arthur Jensen's theoretical underpinning of an IQ that is highly heritable and immutable. They make their pronouncements more palatable by saying that they know intelligence is more complex than a simple number such as the IQ and that one cannot assume people's IQ by casual interaction with them, as well as by using a lower figure for heritability than Jensen did. However, the reader of the book, the authors note, is a member of the cognitive elite (of course, you, reading their book, probably knew that already).

The Bell Curve has generated its greatest controversy because of its discussion of race. In the book and in interviews, Murray de-emphasizes the race issue, noting that only a single chapter (5% of the book) deals with it; class, he says, is the issue. I find the authors' response disingenuous. The heritability and immutability of IQ differences between races is the lynch pin linking intelligence and the cognitive elite. Their arguments that class differences in intelligence are genetic requires evidence that IQ is fixed and is the key to economic success. Hernnstein and Murray's intellectual reliance on Jensen's analysis of race and IQ is a weak foundation for their findings on class. Tucker[17] provides an excellent, detailed discussion of Jensen and the response to his work.

Jensen, Rushton, and Murray and Hernnstein share similar responses to those who are critical of their use of race. They see the criticism of race narrowly and respond to the issue of race only as a social construct. They claim that the social and the biological bases of race are so close that, from an analytical perspective, they are essentially synonymous. In fact, Rushton has argued that because of hypodescent, African-Americans will have more "white genes" and therefore will raise the IQ of the African-American race. As with Jensen and Rushton, the issue of apportionment of human variation by race is *not* considered. Races share the majority of their genes (about 85%). Only 6.3% of genes in human populations can be used to separate populations according to race.[18] In other words, racial variation is a minor portion of human variation. To assume that intelligence and all of the genes and traits are found in this 6.3% stretches credulity.

Hernnstein and Murray are aware that if there are racial differences there must be a reason for them. They briefly discuss the evolutionary aspect of cognitive differences and cautiously accept Rushton's evolutionary interpretation as explicated in *Race, Evolution and Behavior*. They argue that Rushton's work is "plainly science," that he is not a "crackpot or a bigot, that he is not alone in seeking an evolutionary explanation. In a footnote, Hernnstein and Murray allude to

Richard Lynn[19] (editor of the notorious Mankind Quarterly) whose "theory is almost as encompassing" as Rushton's. They also cite C.D. Darlington[20] as an example of an anthropologist or geneticist of a generation that accepted this point of view. Both Lynn and Darlington[19,20] are well known for linking race and behavior. In support of the genetic differences in IQ, Murray and Hernnstein accept Lynn's[19] review of 11 studies of African populations that established an "average African" IQ of 75. (If the bell curve is followed, this means that half of all Africans are mentally retarded.) A review of this research, which Kamins[21] described as "pathetic," shows how shallow the foundations of their argument are. For example, Lynn has extrapolated IQ scores from tests in which the results were not normally distributed. This aspect of *The Bell Curve* lacks rigor and promotes a racist agenda.

The most salient point raised by Hernnstein and Murray is the genetic basis of class difference. They state that the partitioning of cognitive ability has become permanent, and that this will impede movement between classes. Individuals are more likely to mate with others who share their intellectual level. Hernnstein and Murray suggest that differences and disparities between classes will continue to increase. The outlook for those in the lower social and economic strata is bleak because they do not have the "intellectual" tools to move up the economic ladder. Hernnstein and Murray seem to be overly impressed by the strength of the correlation they have found. They are willing to make these assessments on the basis of correlations in the range of 0.3. The fact that these correlations are statistically significant does not mean that they are substantively significant; they explain only 9% of the variation. An even more important point is that Hernnstein and Murray confuse the distinction between correlation and causation.

After 250 years in which race has been the subject of intense study, and even with the advances in molecular biology made in the last 40 years, race as a viable biological unit of study still eludes us. Except for the study of gene flow, race is dead as a scientific method for understanding human variation. Let me do the autopsy. Race has been defined as a breeding population that differs from other breeding populations on the basis of morphological traits, gene frequencies, or both. By definition, because all human populations differ, all populations are races; every trait that distinguishes a population is a racial trait. To avoid this predicament, racial classifications merge populations that share traits or genes. It is the clustering of populations that is the dilemma. There is no objective means of selecting traits that will give a similar racial classification. The classifications vary with the classifier and the traits that he or she arbitrarily selects to group races.

Racial classifications are subjective. For race to be a valid scientific concept, any scientist in any culture who uses acceptable procedures should be able to construct a racial classification that could be replicated by another scientist using the same criteria. The malleability of racial classification is an issue. Racial classifications are social constructs, nothing more and nothing less. The use of biological traits in the classification gives the impression that race is a biological unit of nature. Racial categorization in Brazil uses traditional biological traits such as skin color and hair form, but the classification is influenced by the social and economic status of those being classified. Two individuals who have the same phenotype can be placed in different racial groups if they belong to different social or economic classes. An individual who experiences economic success can be placed in a race that is thought to belong to a higher socioeconomic class. Even siblings may be placed in different racial groups if there is an economic and social difference in their status.

Racial traits are nonconcordant. There is no agreement among the traits used in racial classification. That is, different traits cluster differently in populations. If there is concordance, every trait should result in the same classification. For concordance to occur, each of the traits must be selected for at the same rate and in the same direction. In reality, however, genetic traits are evolving at different rates and in different directions and, consequently, traits become nonconcordant.

Furthermore, there is more variation within a race than there is between races. Lewontin[18] studied the distribution of 17 genetic systems in 169 populations dispersed among eight "races." Only 6.3% of human variation could be accounted for by race. Individuals, not races, are the repository of genetic variability (see Latter[22] for a similar analysis). These studies show a greater variability within than between races. How can race, which represents only 6.3% of mean genetic variability in humans, be the source of all the differences (IQ, hypertension, osteoporosis, low birth weight, hemoglobin levels) that have been ascribed to it by researchers?

Enough is enough. Two-and-a-half centuries of racial research with so few productive results is surely enough. We are, as one of my colleagues notes, applying twentieth-century research tools to eighteenth-century problems. It is time to move on to more interesting and important problems.

Acknowledgment

I thank Professor Alan Swedlund, Chris Kuzawa, and James Fredricks for comments on earlier drafts of this review.

REFERENCES

1 Littlefield A, Lieberman L, Reynolds LT (1982) Redefining race: The potential demise of a concept in physical anthropology. Curr Anthropol 33:641–655.

2 Pirie NW (1952) Concept out of context: Pied pipers of science. Br J Philos Sci 2:269–280.

3 Centers for Disease Control (1993) Use of race and ethnicity in public health surveillance. Summary for CDC/ATSDR Workshop. MMWR 42(RR-10):1–17.

4 Dobzhansky T (1968) Discussion. In Mean M, Dobzhansky T, Tobacach E, Light RE (eds), *Science and the Concept of Race*. New York: Columbia University Press, pp 165–166.

5 Smokovitis VB (1992) Unifying biology: The evolutionary synthesis and evolutionary biology. J Hist Biol 25:1–65.

6 Coon CS (1962) *The Origin of Races*. New York: Alfred M. Knopf.

7 Harris M (1964) *Patterns of Race in the Americas*. New York: Walker.

8 Manoiloff (1927) Discernment of human races by blood: Particularly of Russians from Jews. Am J Phys Anthropol 10:11–21.

9 Boyd WC (1950) *Genetics and the Races of Man*. Boston: Little, Brown & Co.

10 Livingstone F (1958) Anthropological implication of sickle cell gene distribution in

West Africa. Am Anthropol *60*:533–562.
11 Livingstone F (1962) On the non-existence of human races. Curr Anthropol *3*:279–281.
12 Miller A (1995) Professors of hate. In Jacoby R, Glauberman N (eds), *The Bell Curve Debate*. New York: Times Books, p 170.
13 Baker J (1974) *Race*. Oxford: Oxford University Press.
14 Livingstone (1847) *Missionary Travels and Researches in South Africa*. London: Murray.
15 Platt JR (1964) Strong inference. Science *146*:347–353.
16 New York Times.
17 Tucker WH (1994) *The Science and Politics of Racial Research*. Urbana, IL: The University of Illinois Press.
18 Lewontin R (1972) The apportionment of human diversity. Evol Biol *6*:381–398.
19 Lynn R (1991) Race differences in intelligence. A global perspective. Man Quart *31*:255–296.
20 Darlington CD (1969) *The Evolution of Man and Society*. New York: Simon and Shuster.
21 Kamins J (1995) Lies, damned lies and statistics. In Jacoby R, Glauberman N (eds) *The Bell Curve Debate*. New York: Time Books.
22 Latter DBH (1980) Genetic differences within and between populations of the major human subgroups. Am Nat *116*:220–237.

George J. Armelagos
Department of Anthropology
Emory University
Atlanta, GA 30322
antga@anthro.emory.edu

CALENDAR

April 1–3, 1996
BES Annual Symposium: Population and Community Dynamics in the Tropics
Cambridge, UK
Contact Dr. D.M. Newberry, Unit of Tropical Forest Ecology, Department of Biological and Molecular Sciences, University of Stirling, Stirling, UK FK9 4LA

April 9–10, 1996
Paleoanthropology Society
New Orleans, Louisiana
The Paleoanthropology meetings will be held in conjunction with the Society for American Archaeology at the New Orleans Marriott Hotel, 555 Canal Street, New Orleans, LA 70140; phone: 504/581-1000; fax: 504-523-6755. Two full days of papers are planned. Contact Dr. John Yellen, Archaeology Program, Room 995, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230. The registration fee is $15.00 and can be made out to "John Yellen—Special Account" and sent to the above address.

April 11–13, 1996
American Association of Physical Anthropologists
65th Annual Conference
Durham, NC
For local arrangements, contact Dr. Matt Cartmill, Duke University Medical Center, Durham, NC 27710; phone: 919-684-2971; fax: 919-684-8034; email: Matt_Cartmill@Whistle.cellbio.duke.edu.

April 15, 1996
Spring Meeting of the Primate Society of Great Britain
Roehampton Institute, London, UK
Papers and posters on any topic are invited and should be sent to Dr. Caroline Ross or Dr. Ann MacLarnon, Department of Biological and Chemical Sciences, Roehampton Institute London, UK, West Hill, London, SW15 3SN. Inquiries should be directed to Caroline Ross, phone:0181-392-3529; email: c.ross@roehampton.ac.uk, or to Ann MacLarnon, phone: 0181-3923645.

May 13–17, 1996
Course in Forensic Anthropology
Uniformed Services University of the Health Sciences
Bethesda, Maryland
This five-day course surveys the basic principles of forensic anthropology and provides updates on new techniques in the field. A new topic this year is the role of forensic anthropology in mass fatality situations. The course consists of a series of lectures covering topics in the field followed by laboratory sessions emphasizing hands-on analysis of skeletal remains. For more information write to the Center for Advanced Medical Education, Armed Forces Institute of Pathology, Washington DC 20306-6000, phone: 301-295-7921 or toll fee at 800-577-3749 or fax: 301-427-5001.

June 26–30, 1996
Annual Meetings of The Human Behavior and Evolution Society
The 1996 meetings will be held at Northwestern University. For further information, contact William Irons, Dept. of Anthropology, Northwestern University, 1810 Hinman Ave., Evanston, IL 60608-1310. To receive information about fees, lodging, and deadlines for paper submissions, contact Patrick McKim, HBES Treasurer, at pmckim@calpoly.edu.

July 1–5, 1996
Course in Forensic Anthropology
Department of Archaeological Sciences
University of Bradford, UK
This five-day course surveys the basic principles of forensic anthropology and provides updates on new techniques in the field. The full cost of tuition will be $300 with a reduced fee of $150 for students. For further information and travel plans contact John J. McIlwaine, Co-coordinator of Continuing and Professional Education, University of Bradford, UK BD7 1DP; phone: 44-1274-385-482; fax: 44-1274-385-190.

July 24–26, 1996
International Society for Anthrozoology Conference
Cambridge, England
Theme: "The Animal Contract: Exploring the Relationships between Humans and Other Animals." Contact Anthony Podberscek, Department of Clinical Veterinary Medicine, University of Cambridge, Madingley Rd., Cambridge, UK; phone: 0122-333-0846; fax: 0122-333-0886; email: alp18@cus.cam.ac.uk.

August 11–15, 1996
Annual Meeting of the Association for Tropical Biology
Providence, RI
Contact Julie S. Denslow, Executive Director, Department of Plant Biology, Louisiana State University, Baton Rouge, LA 70803

August 11–16, 1996
International Primatological Society / American Society of Primatologists Joint Meeting
Madison, Wisconsin
This joint meeting will be held at the University of Wisconsin, Madison, and hosted by the Wisconsin Regional Primate Center. Provisional registration costs are $150 for regular members, $80 for students, and $200 for non-members. Registration includes opening and closing receptions, program, and abstract booklet. The conference includes oral presentations, posters, videos and film, symposia and workshops. For more information, contact Edith Chan, Wisconsin Regional Primate Center, 1223 Capitol Court, Madison, WI 53715; phone: 608-263-3500; fax: 608-263-4031; email: ipsasp-info@primate.wisc.edu.