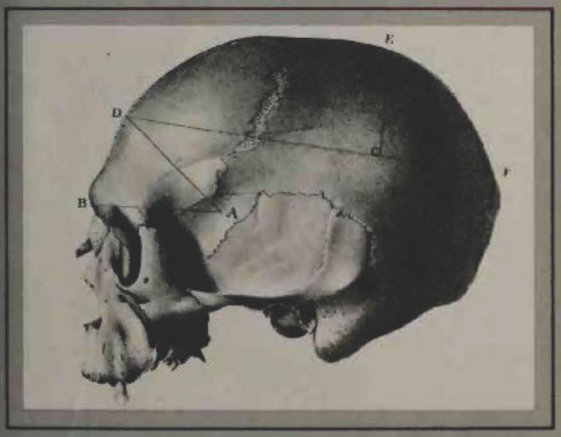
The Mismeasure of Man



Stephen Jay Gould

TWO

American Polygeny and Craniometry before Darwin

Blacks and Indians as Separate, Inferior Species

Order is Heaven's first law; and, this confessed,
Some are, and must be, greater than the rest.
—ALEXANDER POPE, *Essay on Man* (1733)

APPEALS TO REASON or to the nature of the universe have been used throughout history to enshrine existing hierarchies as proper and inevitable. The hierarchies rarely endure for more than a few generations, but the arguments, refurbished for the next round of social institutions, cycle endlessly.

The catalogue of justifications based on nature traverses a range of possibilities: elaborate analogies between rulers and a hierarchy of subordinate classes with the central earth of Ptolemaic astronomy and a ranked order of heavenly bodies circling around it; or appeals to the universal order of a "great chain of being," ranging in a single series from amoebae to God, and including near its apex a graded series of human races and classes. To quote Alexander Pope again:

> Without this just gradation, could they be
> Subjected, these to those, or all to thee?
> .....
> From Nature's chain whatever link you strike,
> Tenth, or ten thousandth, breaks the chain alike.

The humblest, as well as the greatest, play their part in preserving the continuity of universal order; all occupy their appointed roles.

This book treats an argument that, to many people's surprise, seems to be a latecomer: biological determinism, the notion that people at the bottom are constructed of intrinsically inferior material (poor brains, bad genes, or whatever). Plato, as we have seen, cautiously floated this proposal in the *Republic*, but finally branded it as a lie.

Racial prejudice may be as old as recorded human history, but its biological justification imposed the additional burden of intrinsic inferiority upon despised groups, and precluded redemption by conversion or assimilation. The "scientific" argument has formed a primary line of attack for more than a century. In discussing the first biological theory supported by extensive quantitative data—early nineteenth-century craniometry—I must begin by posing a question of causality: did the introduction of inductive science add legitimate data to change or strengthen a nascent argument for racial ranking? Or did a priori commitment to ranking fashion the "scientific" questions asked and even the data gathered to support a foreordained conclusion?

A shared context of culture

In assessing the impact of science upon eighteenth- and nineteenth-century views of race, we must first recognize the cultural milieu of a society whose leaders and intellectuals did not doubt the propriety of racial ranking—with Indians below whites, and blacks below everybody else (Fig. 2.1). Under this universal umbrella, arguments did not contrast equality with inequality. One group—we might call them "hard-liners"—held that blacks were inferior and that their biological status justified enslavement and colonization. Another group—the "soft-liners," if you will—agreed that blacks were inferior, but held that a people's right to freedom did not depend upon their level of intelligence. "Whatever be their degree of talents," wrote Thomas Jefferson, "it is no measure of their rights."

Soft-liners held various attitudes about the nature of black disadvantage. Some argued that proper education and standard of life could "raise" blacks to a white level; others advocated perma-

nent black ineptitude. They also disagreed about the biological or cultural roots of black inferiority. Yet, throughout the egalitarian tradition of the European Enlightenment and the American revolution, I cannot identify any popular position remotely like the "cultural relativism" that prevails (at least by lip-service) in liberal circles today. The nearest approach is a common argument that black inferiority is purely cultural and that it can be completely eradicated by education to a Caucasian standard.

All American culture heroes embraced racial attitudes that would embarrass public-school mythmakers. Benjamin Franklin, while viewing the inferiority of blacks as purely cultural and completely remediable, nonetheless expressed his hope that America would become a domain of whites, undiluted by less pleasing colors.

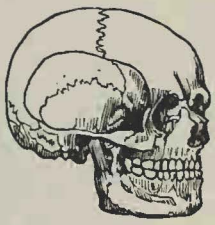
> I could wish their numbers were increased. And while we are, as I may call it, scouring our planet, by clearing America of woods, and so making this side of our globe reflect a brighter light to the eyes of inhabitants in Mars or Venus, why should we . . . darken its people? Why increase the Sons of Africa, by planting them in America, where we have so fair an opportunity, by excluding all blacks and tawneys, of increasing the lovely white and red?* (*Observations Concerning the Increase of Mankind*, 1751).

Others among our heroes argued for biological inferiority. Thomas Jefferson wrote, albeit tentatively: "I advance it, therefore, as a suspicion only, that the blacks, whether originally a distinct race, or made distinct by time and circumstance, are inferior to the whites in the endowment both of body and of mind" (in Gossett,

* I have been struck by the frequency of such aesthetic claims as a basis of racial preference. Although J. F. Blumenbach, the founder of anthropology, had stated that toads must view other toads as paragons of beauty, many astute intellectuals never doubted the equation of whiteness with perfection. Franklin at least had the decency to include the original inhabitants in his future America; but, a century later, Oliver Wendell Holmes rejoiced in the elimination of Indians on aesthetic grounds: ". . . and so the red-crayon sketch is rubbed out, and the canvas is ready for a picture of manhood a little more like God's own image" (in Gossett, 1965, p. 243).

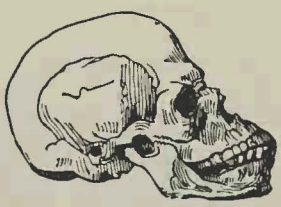
2•1 The unilinear scale of human races and lower relatives according to Nott and Gliddon, 1868. The chimpanzee skull is falsely inflated, and the Negro jaw extended, to give the impression that blacks might even rank lower than the apes.

Apollo Belvidere

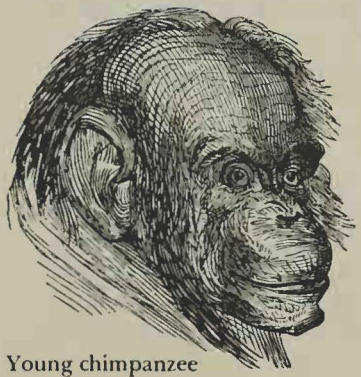


Greek

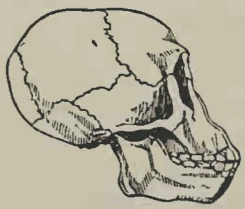
Negro



Creole Negro



Young chimpanzee



Young chimpanzee

2 • 2 An unsubtle attempt to suggest strong affinity between blacks and gorillas. From Nott and Gliddon, *Types of Mankind,* 1854. Nott and Gliddon comment on this figure: "The palpable analogies and dissimilitudes between an inferior type of mankind and a superior type of monkey require no comment."

1965, p. 44). Lincoln's pleasure at the performance of black soldiers in the Union army greatly increased his respect for freedmen and former slaves. But freedom does not imply biological equality, and Lincoln never abandoned a basic attitude, so strongly expressed in the Douglas debates (1858):

> There is a physical difference between the white and black races which I believe will forever forbid the two races living together on terms of social and political equality. And inasmuch as they cannot so live, while they do remain together there must be the position of superior and inferior, and I as much as any other man am in favor of having the superior position assigned to the white race.

Lest we choose to regard this statement as mere campaign rhetoric, I cite this private jotting, scribbled on a fragment of paper in 1859:

> Negro equality! Fudge! How long, in the Government of a God great enough to make and rule the universe, shall there continue knaves to vend, and fools to quip, so low a piece of demagogism as this (in Sinkler, 1972, p. 47).

I do not cite these statements in order to release skeletons from ancient closets. Rather, I quote the men who have justly earned our highest respect in order to show that white leaders of Western nations did not question the propriety of racial ranking during the eighteenth and nineteenth centuries. In this context, the pervasive assent given by scientists to conventional rankings arose from shared social belief, not from objective data gathered to test an open question. Yet, in a curious case of reversed causality, these pronouncements were read as independent support for the political context.

All leading scientists followed social conventions (Figs. 2.2 and 2.3). In the first formal definition of human races in modern taxonomic terms, Linnaeus mixed character with anatomy (*Systema naturae,* 1758). *Homo sapiens afer* (the African black), he proclaimed, is "ruled by caprice"; *Homo sapiens europaeus* is "ruled by customs." Of African women, he wrote: *Feminis sine pudoris; mammae lactantes prolixae*—Women without shame, breasts lactate profusely. The men, he added, are indolent and anoint themselves with grease.

The three greatest naturalists of the nineteenth century did not hold blacks in high esteem. Georges Cuvier, widely hailed in France as the Aristotle of his age, and a founder of geology,

paleontology, and modern comparative anatomy, referred to native Africans as "the most degraded of human races, whose form approaches that of the beast and whose intelligence is nowhere great enough to arrive at regular government" (Cuvier, 1812, p. 105). Charles Lyell, the conventional founder of modern geology, wrote:

> The brain of the Bushman . . . leads towards the brain of the Simiadae [monkeys]. This implies a connexion between want of intelligence and structural assimilation. Each race of Man has its place, like the inferior animals (in Wilson, 1970, p. 347).

Charles Darwin, the kindly liberal and passionate abolitionist,* wrote about a future time when the gap between human and ape will increase by the anticipated extinction of such intermediates as chimpanzees and Hottentots.

> The break will then be rendered wider, for it will intervene between man in a more civilized state, as we may hope, than the Caucasian, and some ape as low as a baboon, instead of as at present between the negro or Australian and the gorilla (*Descent of Man*, 1871, p. 201).

Even more instructive are the beliefs of those few scientists often cited in retrospect as cultural relativisits and defenders of equality. J. F. Blumenbach attributed racial differences to the influences of climate. He protested rankings based on beauty or presumed mental ability and assembled a collection of books written by blacks. Nonetheless, he did not doubt that white people set

* Darwin wrote, for example, in the *Voyage of the Beagle:* "Near Rio de Janeiro I lived opposite to an old lady, who kept screws to crush the fingers of her female slaves. I have stayed in a house where a young household mulatto, daily and hourly, was reviled, beaten, and persecuted enough to break the spirit of the lowest animal. I have seen a little boy, six or seven years old, struck thrice with a horse-whip (before I could interfere) on his naked head, for having handed me a glass of water not quite clean. . . . And these deeds are done and palliated by men, who profess to love their neighbors as themselves, who believe in God, and pray that his Will be done on earth! It makes one's blood boil, yet heart tremble, to think that we Englishmen and our American descendants, with their boastful cry of liberty, have been and are so guilty."

2•3 Two more comparisons of blacks and apes from Nott and Gliddon, 1854. This book was not a fringe document, but the leading American text on human racial differences.

Orangutan

Hottentot wagoner

Chimpanzee

Hottentot from Somerset

a standard, from which all other races must be viewed as departures:

> The Caucasian must, on every physiological principle, be considered as the primary or intermediate of these five principal Races. The two extremes into which it has deviated, are on the one hand the Mongolian, on the other the Ethiopian [African blacks] (1825, p. 37).

Alexander von Humboldt, world traveler, statesman, and greatest popularizer of nineteenth-century science, would be the hero of all modern egalitarians who seek antecedents in history. He, more than any other scientist of his time, argued forcefully and at length against ranking on mental or aesthetic grounds. He also drew political implications from his convictions, and campaigned against all forms of slavery and subjugation as impediments to the natural striving of all people to attain mental excellence. He wrote in the most famous passage of his five-volume *Cosmos:*

> Whilst we maintain the unity of the human species, we at the same time repel the depressing assumption of superior and inferior races of men. There are nations more susceptible of cultivation than others—but none in themselves nobler than others. All are in like degree designed for freedom (1849, p. 368).

Yet even Humboldt invoked innate mental difference to resolve some dilemmas of human history. Why, he asks in the second volume of *Cosmos,* did the Arabs explode in culture and science soon after the rise of Islam, while Scythian tribes of southeastern Europe stuck to their ancient ways; for both peoples were nomadic and shared a common climate and environment? Humboldt did find some cultural differences—greater contact of Arabs with surrounding urbanized cultures, for example. But, in the end, he labeled Arabs as a "more highly gifted race" with greater "natural adaptability for mental cultivation" (1849, p. 578).

Alfred Russel Wallace, codiscoverer of natural selection with Darwin, is justly hailed as an antiracist. Indeed, he did affirm near equality in the innate mental capacity of all peoples. Yet, curiously, this very belief led him to abandon natural selection and return to divine creation as an explanation for the human mind—much to Darwin's disgust. Natural selection, Wallace argued, can only build structures immediately useful to animals possessing them. The

brain of savages is, potentially, as good as ours. But they do not use it fully, as the rudeness and inferiority of their culture indicate. Since modern savages are much like human ancestors, our brain must have developed its higher capacities long before we put them to any use.

Preevolutionary styles of scientific racism: monogenism and polygenism

Preevolutionary justifications for racial ranking proceeded in two modes. The "softer" argument—again using some inappropriate definitions from modern perspectives—upheld the scriptural unity of all peoples in the single creation of Adam and Eve. This view was called *monogenism*—or origin from a single source. Human races are a product of degeneration from Eden's perfection. Races have declined to different degrees, whites least and blacks most. Climate proved most popular as a primary cause for racial distinction. Degenerationists differed on the remediability of modern deficits. Some held that the differences, though developed gradually under the influence of climate, were now fixed and could never be reversed. Others argued that the fact of gradual development implied reversibility in appropriate environments. Samuel Stanhope Smith, president of the College of New Jersey (later Princeton), hoped that American blacks, in a climate more suited to Caucasian temperaments, would soon turn white. But other degenerationists felt that improvement in benevolent climes could not proceed rapidly enough to have any impact upon human history.

The "harder" argument abandoned scripture as allegorical and held that human races were separate biological species, the descendants of different Adams. As another form of life, blacks need not participate in the "equality of man." Proponents of this argument were called "polygenists."

Degenerationism was probably the more popular argument, if only because scripture was not to be discarded lightly. Moreoever, the interfertility of all human races seemed to guarantee their union as a single species under Buffon's criterion that members of a species be able to breed with each other, but not with representatives of any other group. Buffon himself, the greatest naturalist of eighteenth-century France, was a strong abolitionist and exponent

of improvement for inferior races in appropriate environments. But he never doubted the inherent validity of a white standard:

> The most temperate climate lies between the 40th and 50th degree of latitude, and it produces the most handsome and beautiful men. It is from this climate that the ideas of the genuine color of mankind, and of the various degrees of beauty ought to be derived.

Some degenerationists cited their commitments in the name of human brotherhood. Etienne Serres, a famous French medical anatomist, wrote in 1860 that the perfectability of lower races distinguished humans as the only species subject to improvement by its own efforts. He lambasted polygeny as a "savage theory" that "seems to lend scientific support to the enslavement of races less advanced in civilization than the Caucasian":

> Their conclusion is that the Negro is no more a white man than a donkey is a horse or a zebra—a theory put into practice in the United States of America, to the shame of civilization (1860, pp. 407–408).

Nonetheless, Serres worked to document the signs of inferiority among lower races. As an anatomist, he sought evidence within his specialty and confessed to some difficulty in establishing both criteria and data. He settled on the theory of recapitulation—the idea that higher creatures repeat the adult stages of lower animals during their own growth (Chapter 4). Adult blacks, he argued, should be like white children, adult Mongolians like white adolescents. He searched diligently but devised nothing much better than the distance between navel and penis—"that ineffaceable sign of embryonic life in man." This distance is small relative to body height in babies of all races. The navel migrates upward during growth, but attains greater heights in whites than in yellows, and never gets very far at all in blacks. Blacks remain perpetually like white children and announce their inferiority thereby.

Polygeny, though less popular, had its illustrious supporters as well. David Hume did not spend his life absorbed in pure thought. He held a number of political posts, including the stewardship of the English colonial office in 1766. Hume advocated both the separate creation and innate inferiority of nonwhite races:

> I am apt to suspect the negroes and in general all the other species of men (for there are four or five different kinds) to be naturally inferior to

the whites. There never was a civilized nation of any other complexion than white, nor even any individual eminent either in action or speculation.* No ingenious manufacturers amongst them, no arts, no sciences. . . . Such a uniform and constant difference could not happen in so many countries and ages, if nature had not made an original distinction betwixt these breeds of men. Not to mention our colonies, there are negroe slaves dispersed all over Europe, of which none ever discovered any symptoms of ingenuity, tho' low people without education will start up amongst us, and distinguish themselves in every profession. In Jamaica indeed they talk of one negroe as a man of parts and learning; but 'tis likely he is admired for very slender accomplishments like a parrot who speaks a few words plainly (in Popkin, 1974, p. 143; see Popkin's excellent article for a long analysis of Hume as a polygenist).

Charles White, an English surgeon, wrote the strongest defense of polygeny in 1799—*Account of the Regular Gradation in Man.* White abandoned Buffon's criterion of interfertility in defining species, pointing to successful hybrids between such conventionally separate groups as foxes, wolves, and jackals.† He railed against the idea that climate might produce racial differences, arguing that such ideas might lead, by extension, to the "degrading notion" of evolution between species. He disclaimed any political motivation and announced an untainted purpose: "to investigate a proposition in natural history." He explicitly rejected any extension of polygeny to "countenance the pernicious practice of enslaving man-

* This "inductive" argument from human cultures is far from dead as a defense of racism. In his *Study of History* (1934 edition), Arnold Toynbee wrote: "When we classify mankind by color, the only one of the primary races, given by this classification, which has not made a creative contribution to any of our twenty-one civilizations is the Black Race" (in Newby, 1969, p. 217).

† Modern evolutionary theory does invoke a barrier to interfertility as the primary criterion for status as a species. In the standard definition: "Species are actually or potentially interbreeding populations sharing a common gene pool, and reproductively isolated from all other groups." Reproductive isolation, however, does not mean that individual hybrids never arise, but only that the two species maintain their integrity in natural contact. Hybrids may be sterile (mules). Fertile hybrids may even arise quite frequently, but if natural selection acts preferentially against them (as a result of inferiority in structural design, rejection as mates by full members of either species, etc.) they will not increase in frequency and the two species will not amalgamate. Often fertile hybrids can be produced in the laboratory by imposing situations not encountered in nature (forced breeding between species that normally mature at different times of the year, for example). Such examples do not refute a status as separate species because the two groups do not amalgamate in the wild (maturation at different times of the year may be an efficient means of reproductive isolation).

kind." White's criteria of ranking tended toward the aesthetic, and his argument included the following gem, often quoted. Where else but among Caucasians, he argued, can we find

> . . . that nobly arched head, containing such a quantity of brain. . . . Where that variety of features, and fulness of expression; those long, flowing, graceful ring-lets; that majestic beard, those rosy cheeks and coral lips? Where that . . . noble gait? In what other quarter of the globe shall we find the blush that overspreads the soft features of the beautiful women of Europe, that emblem of modesty, of delicate feelings . . . where, except on the bosom of the European woman, two such plump and snowy white hemispheres, tipt with vermillion (in Stanton, 1960, p. 17).

Louis Agassiz—America's theorist of polygeny

Ralph Waldo Emerson argued that intellectual emancipation should follow political independence. American scholars should abandon their subservience to European styles and theories. We have, Emerson wrote, "listened too long to the courtly muses of Europe." "We will walk on our own feet; we will work with our own hands; we will speak our own minds" (in Stanton, 1960, p. 84).

In the early to mid-nineteenth century, the budding profession of American science organized itself to follow Emerson's advice. A collection of eclectic amateurs, bowing before the prestige of European theorists, became a group of professionals with indigenous ideas and an internal dynamic that did not require constant fueling from Europe. The doctrine of polygeny acted as an important agent in this transformation; for it was one of the first theories of largely American origin that won the attention and respect of European scientists—so much so that Europeans referred to polygeny as the "American school" of anthropology. Polygeny had European antecedents, as we have seen, but Americans developed the data cited in its support and based a large body of research on its tenets. I shall concentrate on the two most famous advocates of polygeny—Agassiz the theorist and Morton the data analyst; and I shall try to uncover both the hidden motives and the finagling of data so central to their support.* For starters, it is obviously not accidental that a nation still practicing slavery and expelling its aboriginal inhabitants from their homelands should have provided

* An excellent history of the entire "American school" can be found in W. Stanton's *The Leopard's Spots.*

a base for theories that blacks and Indians are separate species, inferior to whites.

Louis Agassiz (1807–1873), the great Swiss naturalist, won his reputation in Europe, primarily as Cuvier's disciple and a student of fossil fishes. His immigration to America in the 1840s immediately elevated the status of American natural history. For the first time, a major European theorist had found enough of value in the United States to come and stay. Agassiz became a professor at Harvard, where he founded and directed the Museum of Comparative Zoology until his death in 1873 (I occupy an office in the original wing of his building). Agassiz was a charmer; he was lionized in social and intellectual circles from Boston to Charlestown. He spoke for science with boundless enthusiasm and raised money with equal zeal to support his buildings, collections, and publications. No man did more to establish and enhance the prestige of American biology during the nineteenth century.

Agassiz also became the leading spokesman for polygeny in America. He did not bring this theory with him from Europe. He converted to the doctrine of human races as separate species after his first experiences with American blacks.

Agassiz did not embrace polygeny as a conscious political doctrine. He never doubted the propriety of racial ranking, but he did count himself among the opponents of slavery. His adherence to polygeny flowed easily from procedures of biological research that he had developed in other and earlier contexts. He was, first of all, a devout creationist who lived long enough to become the only major scientific opponent of evolution. But nearly all scientists were creationists before 1859, and most did not become polygenists (racial differentiation within a single species posed no threat to the doctrine of special creation—just consider breeds of dogs and cattle). Agassiz's predisposition to polygeny arose primarily from two aspects of his personal theories and methods:

1. In studying the geographic distribution of animals and plants, Agassiz developed a theory about "centers of creation." He believed that species were created in their proper places and did not generally migrate far from these centers. Other biogeographers invoked creation in a single spot with extensive migration thereafter. Thus, when Agassiz studied what we would now regard as a single widespread species, divided into fairly distinct geographical races, he tended to name several separate species, each

created at its center of origin. *Homo sapiens* is a primary example of a cosmopolitan, variable species.

2. Agassiz was an extreme splitter in his taxonomic practice. Taxonomists tend to fall into two camps—"lumpers," who concentrate on similarities and amalgamate groups with small differences into single species, and "splitters," who focus on minute distinctions and establish species on the smallest peculiarities of design. Agassiz was a splitter among splitters. He once named three genera of fossil fishes from isolated teeth that a later paleontologist found in the variable dentition of a single individual. He named invalid species of freshwater fishes by the hundreds, basing them upon peculiar individuals within single, variable species. An extreme splitter who viewed organisms as created over their entire range might well be tempted to regard human races as separate creations. Nonetheless, before coming to America, Agassiz advocated the doctrine of human unity—even though he viewed our variation as exceptional. He wrote in 1845:

> Here is revealed anew the superiority of the human genre and its greater independence in nature. Whereas the animals are distinct species in the different zoological provinces to which they appertain, man, despite the diversity of his races, constitutes one and the same species over all the surface of the globe (in Stanton, 1960, p. 101).

Agassiz may have been predisposed to polygeny by biological belief, but I doubt that this pious man would have abandoned the Biblical orthodoxy of a single Adam if he had not been confronted both by the sight of American blacks and the urgings of his polygenist colleagues. Agassiz never generated any data for polygeny. His conversion followed an immediate visceral judgment and some persistent persuasion by friends. His later support rested on nothing deeper in the realm of biological knowledge.

Agassiz had never seen a black person in Europe. When he first met blacks as servants at his Philadelphia hotel in 1846, he experienced a pronounced visceral revulsion. This jarring experience, coupled with his sexual fears about miscegenation, apparently established his conviction that blacks are a separate species. In a remarkably candid passage, he wrote to his mother from America:

> It was in Philadelphia that I first found myself in prolonged contact with negroes; all the domestics in my hotel were men of color. I can scarcely

express to you the painful impression that I received, especially since the feeling that they inspired in me is contrary to all our ideas about the confraternity of the human type [*genre*] and the unique origin of our species. But truth before all. Nevertheless, I experienced pity at the sight of this degraded and degenerate race, and their lot inspired compassion in me in thinking that they are really men. Nonetheless, it is impossible for me to repress the feeling that they are not of the same blood as us. In seeing their black faces with their thick lips and grimacing teeth, the wool on their head, their bent knees, their elongated hands, their large curved nails, and especially the livid color of the palm of their hands, I could not take my eyes off their face in order to tell them to stay far away. And when they advanced that hideous hand towards my plate in order to serve me, I wished I were able to depart in order to eat a piece of bread elsewhere, rather than dine with such service. What unhappiness for the white race—to have tied their existence so closely with that of negroes in certain countries! God preserve us from such a contact! (Agassiz to his mother, December 1846.) (The standard *Life and Letters*, compiled by Agassiz's wife, omits these lines in presenting an expurgated version of this famous letter. Other historians have paraphrased them or passed them by. I recovered this passage from the original manuscript in Harvard's Houghton Library and have translated it, verbatim, for the first time so far as I know.)

Agassiz published his major statement on human races in the *Christian Examiner* for 1850. He begins by dismissing as demagogues both the divines who would outlaw him as an infidel (for preaching the doctrine of multiple Adams) and the abolitionists who would brand him as a defender of slavery:

> It has been charged upon the views here advanced that they tend to the support of slavery. . . . Is that a fair objection to a philosophical investigation? Here we have to do only with the question of the origin of men; let the politicians, let those who feel themselves called upon to regulate human society, see what they can do with the results. . . . We disclaim, however, all connection with any question involving political matters. It is simply with reference to the possibility of appreciating the differences existing between different men, and of eventually determining whether they have originated all over the world, and under what circumstances, that we have here tried to trace some facts respecting the human races (1850, p. 113).

Agassiz then presents his argument: The theory of polygeny does not constitute an attack upon the scriptural doctrine of human unity. Men are bound by a common structure and sympa-

thy, even though races were created as separate species. The Bible does not speak about parts of the world unknown to the ancients; the tale of Adam refers only to the origin of Caucasians. Negroes and Caucasians are as distinct in the mummified remains of Egypt as they are today. If human races were the product of climatic influence, then the passage of three thousand years would have engendered substantial changes (Agassiz had no inkling of human antiquity; he believed that three thousand years included a major chunk of our entire history). Modern races occupy definite, non-overlapping, geographic areas—even though some ranges have been blurred or obliterated by migration. As physically distinct, temporally invariant groups with discrete geographical ranges, human races met all Agassiz's biological criteria for separate species.

> These races must have originated . . . in the same numerical proportions, and over the same area, in which they now occur. . . . They cannot have originated in single individuals, but must have been created in that numeric harmony which is characteristic of each species; men must have originated in nations, as the bees have originated in swarms (pp. 128–129).

Then, approaching the end of his article, Agassiz abruptly shifts his ground and announces a moral imperative—even though he had explicitly justified his inquiry by casting it as an objective investigation of natural history.

> There are upon earth different races of men, inhabiting different parts of its surface, which have different physical characters; and this fact . . . presses upon us the obligation to settle the relative rank among these races, the relative value of the characters peculiar to each, in a scientific point of view. . . . As philosophers it is our duty to look it in the face (p. 142).

As direct evidence for differential, innate value Agassiz ventures no further than the standard set of Caucasian cultural stereotypes:

> The indominable, courageous, proud Indian—in how very different a light he stands by the side of the submissive, obsequious, imitative negro, or by the side of the tricky, cunning, and cowardly Mongolian! Are not these facts indications that the different races do not rank upon one level in nature (p. 144).

Blacks, Agassiz declares, must occupy the bottom rung of any objective ladder:

It seems to us to be mock-philanthropy and mock-philosophy to assume that all races have the same abilities, enjoy the same powers, and show the same natural dispositions, and that in consequence of this equality they are entitled to the same position in human society. History speaks here for itself. . . . This compact continent of Africa exhibits a population which has been in constant intercourse with the white race, which has enjoyed the benefit of the example of the Egyptian civilization, of the Phoenician civilization, of the Roman civilization, of the Arab civilization . . . and nevertheless there has never been a regulated society of black men developed on that continent. Does not this indicate in this race a peculiar apathy, a peculiar indifference to the advantages afforded by civilized society? (pp. 143–144).

If Agassiz had not made his political message clear, he ends by advocating specific social policy. Education, he argues, must be tailored to innate ability; train blacks in hand work, whites in mind work:

What would be the best education to be imparted to the different races in consequence of their primitive difference, . . . We entertain not the slightest doubt that human affairs with reference to the colored races would be far more judiciously conducted if, in our intercourse with them, we were guided by a full consciousness of the real difference existing between us and them, and a desire to foster those dispositions that are eminently marked in them, rather than by treating them on terms of equality (p. 145).

Since those "eminently marked" dispositions are submissiveness, obsequiousness, and imitation, we can well imagine what Agassiz had in mind. I have treated this paper in detail because it is so typical of its genre—advocacy of social policy couched as a dispassionate inquiry into scientific fact. The strategy is by no means moribund today.

In a later correspondence, pursued in the midst of the Civil War, Agassiz expressed his political views more forcefully and at greater length. (These letters are also expurgated without indication in the standard version published by Agassiz's wife. Again, I have restored passages from the original letters in Harvard's Houghton Library.) S. G. Howe, a member of Lincoln's Inquiry Commission, asked Agassiz's opinion about the role of blacks in a reunited nation. (Howe, known best for his work in prison reform and education of the blind, was the husband of Julia Ward Howe,

author of the "Battle Hymn of the Republic".) In four long and impassioned letters, Agassiz pleaded his case. The persistence of a large and permanent black population in America must be acknowledged as a grim reality. Indians, driven by their commendable pride, may perish in battle, but "the negro exhibits by nature a pliability, a readiness to accommodate himself to circumstances, a proneness to imitate those among whom he lives" (9 August 1863).

Although legal equality must be granted to all, blacks should be denied social equality, lest the white race be compromised and diluted: "Social equality I deem at all time impracticable. It is a natural impossibility flowing from the very character of the negro race" (10 August 1863); for blacks are "indolent, playful, sensuous, imitative, subservient, good natured, versatile, unsteady in their purpose, devoted, affectionate, in everything unlike other races, they may but be compared to children, grown in the stature of adults while retaining a childlike mind. . . . Therefore I hold that they are incapable of living on a footing of social equality with the whites, in one and the same community, without being an element of social disorder" (10 August 1863). Blacks must be regulated and limited, lest an injudicious award of social privilege sow later discord:

> No man has a right to what he is unfit to use. . . . Let us beware of granting too much to the negro race in the beginning, lest it become necessary to recall violently some of the privileges which they may use to our detriment and their own injury (10 August 1863).

For Agassiz, nothing inspired more fear than the prospect of amalgamation by intermarriage. White strength depends upon separation: "The production of halfbreeds is as much a sin against nature, as incest in a civilized community is a sin against purity of character. . . . Far from presenting to me a natural solution of our difficulties, the idea of amalgamation is most repugnant to my feelings, I hold it to be a perversion of every natural sentiment. . . . No efforts should be spared to check that which is abhorrent to our better nature, and to the progress of a higher civilization and a purer morality" (9 August 1863).

Agassiz now realizes that he has argued himself into a corner. If interbreeding among races (separate species to Agassiz) is unnatural and repugnant, why are "halfbreeds" so common in America?

Agassiz attributes this lamentable fact to the sexual receptiveness of housemaids and the naïveté of young Southern gentlemen. The servants, it seems, are halfbreeds already (we are not told how their parents overcame a natural repugnance for one another); young men respond aesthetically to the white half, while a degree of black heritage loosens the natural inhibitions of a higher race. Once acclimated, the poor young men are hooked, and they acquire a taste for pure blacks:

> As soon as the sexual desires are awakening in the young men of the South, they find it easy to gratify themselves by the readiness with which they are met by colored [halfbreed] house servants. . . . This blunts his better instincts in that direction and leads him gradually to seek more spicy partners, as I have heard the full blacks called by fast young men (9 August 1863).

Finally, Agassiz combines vivid image and metaphor to warn against the ultimate danger of a mixed and enfeebled people:

> Conceive for a moment the difference it would make in future ages, for the prospect of republican institutions and our civilization generally, if instead of the manly population descended from cognate nations the United States should hereafter be inhabited by the effeminate progeny of mixed races, half indian, half negro, sprinkled with white blood. . . . I shudder from the consequences. We have already to struggle, in our progress, against the influence of universal equality, in consequence of the difficulty of preserving the acquisitions of individual eminence, the wealth of refinement and culture growing out of select associations. What would be our condition if to these difficulties were added the far more tenacious influences of physical disability. . . . How shall we eradicate the stigma of a lower race when its blood has once been allowed to flow freely into that of our children (10 August 1863).*

Agassiz concludes that legal freedom awarded to slaves in manumission must spur the enforcement of rigid social separation among races. Fortunately, nature shall be the accomplice of moral

*E. D. Cope, America's leading paleontologist and evolutionary biologist, reiterated the same theme even more forcefully in 1890 (p. 2054): "The highest race of man cannot afford to lose or even to compromise the advantages it has acquired by hundreds of centuries of toil and hardship, by mingling its blood with the lowest. . . . We cannot cloud or extinguish the fine nervous susceptibility, and the mental force, which cultivation develops in the constitution of the Indo-European, by the fleshly instincts, and dark mind of the African. Not only is the mind stagnated, and the life of mere living introduced in its stead, but the possibility of resurrection is rendered doubtful or impossible."

virtue; for people, free to choose, gravitate naturally toward the climates of their original homeland. The black species, created for hot and humid conditions, will prevail in the Southern lowlands, though whites will maintain dominion over the seashore and elevated ground. The new South will contain some Negro states. We should bow before this necessity and admit them into the Union; we have, after all, already recognized both "Haity and Liberia."* But the bracing North is not a congenial home for carefree and lackadaisical people, created for warmer regions. Pure blacks will migrate South, leaving a stubborn residue to dwindle and die out in the North: "I hope it may gradually die out in the north where it has only an artificial foothold" (11 August 1863). As for the mulattoes, "their sickly physique and their impaired fecundity" should assure their demise once the shackles of slavery no longer provide an opportunity for unnatural interbreeding.

Agassiz's world collapsed during the last decade of his life. His students rebelled; his supporters defected. He remained a hero to the public, but scientists began to regard him as a rigid and aging dogmatist, standing firm in his antiquated beliefs before the Darwinian tide. But his social preferences for racial segregation prevailed—all the more because his fanciful hope for voluntary geographic separation did not.

Samuel George Morton—empiricist of polygeny

Agassiz did not spend all his time in Philadelphia reviling black waiters. In the same letter to his mother, he wrote in glowing terms of his visit to the anatomical collection of Philadelphia's distinguished scientist and physician Samuel George Morton: "Imagine a series of 600 skulls, most of Indians from all tribes who inhabit or once inhabited all of America. Nothing like it exists anywhere else. This collection, by itself, is worth a trip to America" (Agassiz to his mother, December 1846, translated from the original letter in Houghton Library, Harvard University).

*Not all detractors of blacks were so generous. E. D. Cope, who feared that miscegenation would block the path to heaven (see preceding footnote), advocated the return of all blacks to Africa (1890, p. 2053): "Have we not burdens enough to carry in the European peasantry which we are called on every year to receive and assimilate? Is our own race on a plane sufficiently high, to render it safe for us to carry eight millions of dead material in the very center of our vital organism?"

Agassiz speculated freely and at length, but he amassed no data to support his polygenic theory. Morton, a Philadelphia patrician with two medical degrees—one from fashionable Edinburgh—provided the "facts" that won worldwide respect for the "American school" of polygeny. Morton began his collection of human skulls in the 1820s; he had more than one thousand when he died in 1851. Friends (and enemies) referred to his great charnel house as "the American Golgotha."

Morton won his reputation as the great data-gatherer and objectivist of American science, the man who would raise an immature enterprise from the mires of fanciful speculation. Oliver Wendell Holmes praised Morton for "the severe and cautious character" of his works, which "from their very nature are permanent data for all future students of ethnology" (in Stanton, 1960, p. 96). The same Humboldt who had asserted the inherent equality of all races wrote:

> The craniological treasures which you have been so fortunate as to unite in your collection, have in you found a worthy interpreter. Your work is equally remarkable for the profundity of its anatomical views, the numerical detail of the relations of organic conformation, and the absence of those poetical reveries which are the myths of modern physiology (in Meigs, 1851, p. 48).

When Morton died in 1851, the *New York Tribune* wrote that "probably no scientific man in America enjoyed a higher reputation among scholars throughout the world, than Dr. Morton" (in Stanton, 1960, p. 144).

Yet Morton gathered skulls neither for the dilettante's motive of abstract interest nor the taxonomist's zeal for complete representation. He had a hypothesis to test: that a ranking of races could be established objectively by physical characteristics of the brain, particularly by its size. Morton took a special interest in native Americans. As George Combe, his fervent friend and supporter, wrote:

> One of the most singular features in the history of this continent, is, that the aboriginal races, with few exceptions, have perished or constantly receded, before the Anglo-Saxon race, and have in no instance either mingled with them as equals, or adopted their manners and civilization. These phenomena must have a cause; and can any inquiry be at once more inter-

esting and philosophical than that which endeavors to ascertain whether that cause be connected with a difference in the brain between the native American race, and their conquering invaders (Combe and Coates, in review of Morton's *Crania Americana*, 1840, p. 352).

Moreover, Combe argued that Morton's collection would acquire true scientific value *only if* mental and moral worth could be read from brains: "If this doctrine be unfounded, these skulls are mere facts in Natural History, presenting no particular information as to the mental qualities of the people" (from Combe's appendix to Morton's *Crania Americana*, 1839, p. 275).

Although he vacillated early in his career, Morton soon became a leader among the American polygenists. He wrote several articles to defend the status of human races as separate, created species. He took on the strongest claim of opponents—the interfertility of all human races—by arguing from both sides. He relied on travelers' reports to claim that some human races—Australian aborigines and Caucasians in particular—very rarely produce fertile offspring (Morton, 1851). He attributed this failure to "a disparity of primordial organization." But, he continued, Buffon's criterion of interfertility must be abandoned in any case, for hybridization is common in nature, even between species belonging to different genera (Morton, 1847, 1850). Species must be redefined as "a primordial organic form" (1850, p. 82). "Bravo, my dear Sir," wrote Agassiz in a letter, "you have at last furnished science with a true philosophical definition of species" (in Stanton, 1960, p. 141). But how to recognize a primordial form? Morton replied: "If certain existing organic types can be traced back into the 'night of time,' as dissimilar as we see them now, is it not more reasonable to regard them as aboriginal, than to suppose them the mere and accidental derivations of an isolated patriarchal stem of which we know nothing?" (1850, p. 82). Thus, Morton regarded several breeds of dogs as separate species because their skeletons resided in the Egyptian catacombs, as recognizable and distinct from other breeds as they are now. The tombs also contained blacks and Caucasians. Morton dated the beaching of Noah's Ark on Ararat at 4,179 years before his time, and the Egyptian tombs at just 1,000 years after that—clearly not enough time for the sons of Noah to differentiate into races. (How, he asks, can we believe that races changed so rapidly for 1,000 years, and not at all for 3,000 years since then?) Human

races must have been separate from the start (Morton, 1839, p. 88).

But separate, as the Supreme Court once said, need not mean unequal. Morton therefore set out to establish relative rank on "objective" grounds. He surveyed the drawings of ancient Egypt and found that blacks are invariably depicted as menials—a sure sign that they have always played their appropriate biological role: "Negroes were numerous in Egypt, but their social position in ancient times was the same that it is now, that of servants and slaves" (Morton, 1844, p. 158). (A curious argument, to be sure, for these blacks had been captured in warfare; sub-Saharan societies depicted blacks as rulers.)

But Morton's fame as a scientist rested upon his collection of skulls and their role in racial ranking. Since the cranial cavity of a human skull provides a faithful measure of the brain it once contained, Morton set out to rank races by the average sizes of their brains. He filled the cranial cavity with sifted white mustard seed, poured the seed back into a graduated cylinder and read the skull's volume in cubic inches. Later on, he became dissatisfied with mustard seed because he could not obtain consistent results. The seeds did not pack well, for they were too light and still varied too much in size, despite sieving. Remeasurements of single skulls might differ by more than 5 percent, or 4 cubic inches in skulls with an average capacity near 80 cubic inches. Consequently, he switched to one-eighth-inch-diameter lead shot "of the size called BB" and achieved consistent results that never varied by more than a single cubic inch for the same skull.

Morton published three major works on the sizes of human skulls—his lavish, beautifully illustrated volume on American Indians, the *Crania Americana* of 1839; his studies on skulls from the Egyptian tombs, the *Crania Aegyptiaca* of 1844; and the epitome of his entire collection in 1849. Each contained a table, summarizing his results on average skull volumes arranged by race. I have reproduced all three tables here (Tables 2.1 to 2.3). They represent the major contribution of American polygeny to debates about racial ranking. They outlived the theory of separate creations and were reprinted repeatedly during the nineteenth century as irrefutable, "hard" data on the mental worth of human races (see p. 84). Needless to say, they matched every good Yankee's prejudice—whites on top, Indians in the middle, and blacks on the bot-

Table 2 • 1 Morton's summary table of cranial capacity by race

RACE	N	INTERNAL CAPACITY (IN^3) MEAN	LARGEST	SMALLEST
Caucasian	52	87	109	75
Mongolian	10	83	93	69
Malay	18	81	89	64
American	144	82	100	60
Ethiopian	29	78	94	65

Table 2 • 2 Cranial capacities for skulls from Egyptian tombs

PEOPLE	MEAN CAPACITY (IN^3)	N
Caucasian		
Pelasgic	88	21
Semitic	82	5
Egyptian	80	39
Negroid	79	6
Negro	73	1

tom; and, among whites, Teutons and Anglo-Saxons on top, Jews in the middle, and Hindus on the bottom. Moreover, the pattern had been stable throughout recorded history, for whites had the same advantage over blacks in ancient Egypt. Status and access to power in Morton's America faithfully reflected biological merit. How could sentimentalists and egalitarians stand against the dictates of nature? Morton had provided clean, objective data based on the largest collection of skulls in the world.

During the summer of 1977 I spent several weeks reanalyzing Morton's data. (Morton, the self-styled objectivist, published all his raw information. We can infer with little doubt how he moved from raw measurements to summary tables.) In short, and to put it bluntly, Morton's summaries are a patchwork of fudging and finagling in the clear interest of controlling a priori convictions. Yet—and this is the most intriguing aspect of the case—I find no evidence of conscious fraud; indeed, had Morton been a conscious fudger, he would not have published his data so openly.

Conscious fraud is probably rare in science. It is also not very interesting, for it tells us little about the nature of scientific activity.

Table 2 • 3 *Morton's final summary of cranial capacity by race*

RACES AND FAMILIES	N	CRANIAL CAPACITY (IN^3) LARGEST	SMALLEST	MEAN	MEAN
MODERN CAUCASIAN GROUP					
Teutonic Family					
Germans	18	114	70	90	
English	5	105	91	96	92
Anglo-Americans	7	97	82	90	
Pelasgic Family	10	94	75	84	
Celtic Family	6	97	78	87	
Indostanic Family	32	91	67	80	
Semitic Family	3	98	84	89	
Nilotic Family	17	96	66	80	
ANCIENT CAUCASIAN GROUP					
Pelasgic Family	18	97	74	88	
Nilotic Family	55	96	68	80	
MONGOLIAN GROUP					
Chinese Family	6	91	70	82	
MALAY GROUP					
Malayan Family	20	97	68	86	85
Polynesian Family	3	84	82	83	
AMERICAN GROUP					
Toltecan Family					
Peruvians	155	101	58	75	79
Mexicans	22	92	67	79	
Barbarous Tribes	161	104	70	84	
NEGRO GROUP					
Native African Family	62	99	65	83	83
American-born Negroes	12	89	73	82	
Hottentot Family	3	83	68	75	
Australians	8	83	63	75	

Liars, if discovered, are excommunicated; scientists declare that their profession has properly policed itself, and they return to work, mythology unimpaired, and objectively vindicated. The prevalence of *unconscious* finagling, on the other hand, suggests a

general conclusion about the social context of science. For if scientists can be honestly self-deluded to Morton's extent, then prior prejudice may be found anywhere, even in the basics of measuring bones and toting sums.

The case of Indian inferiority: Crania Americana*

Morton began his first and largest work, the *Crania Americana* of 1839, with a discourse on the essential character of human races. His statements immediately expose his prejudices. Of the "Greenland esquimaux," he wrote: "They are crafty, sensual, ungrateful, obstinate and unfeeling, and much of their affection for their children may be traced to purely selfish motives. They devour the most disgusting aliments uncooked and uncleaned, and seem to have no ideas beyond providing for the present moment. . . . Their mental faculties, from infancy to old age, present a continued childhood. . . . In gluttony, selfishness and ingratitude, they are perhaps unequalled by any other nation of people" (1839, p. 54). Morton thought little better of other Mongolians, for he wrote of the Chinese (p. 50): "So versatile are their feelings and actions, that they have been compared to the monkey race, whose attention is perpetually changing from one object to another." The Hottentots, he claimed (p. 90), are "the nearest approximation to the lower animals. . . . Their complexion is a yellowish brown, compared by travellers to the peculiar hue of Europeans in the last stages of jaundice. . . . The women are represented as even more repulsive in appearance than the men." Yet, when Morton had to describe one Caucasian tribe as a "mere horde of rapacious banditti" (p. 9), he quickly added that "their moral perceptions, under the influence of an equitable government, would no doubt assume a much more favorable aspect."

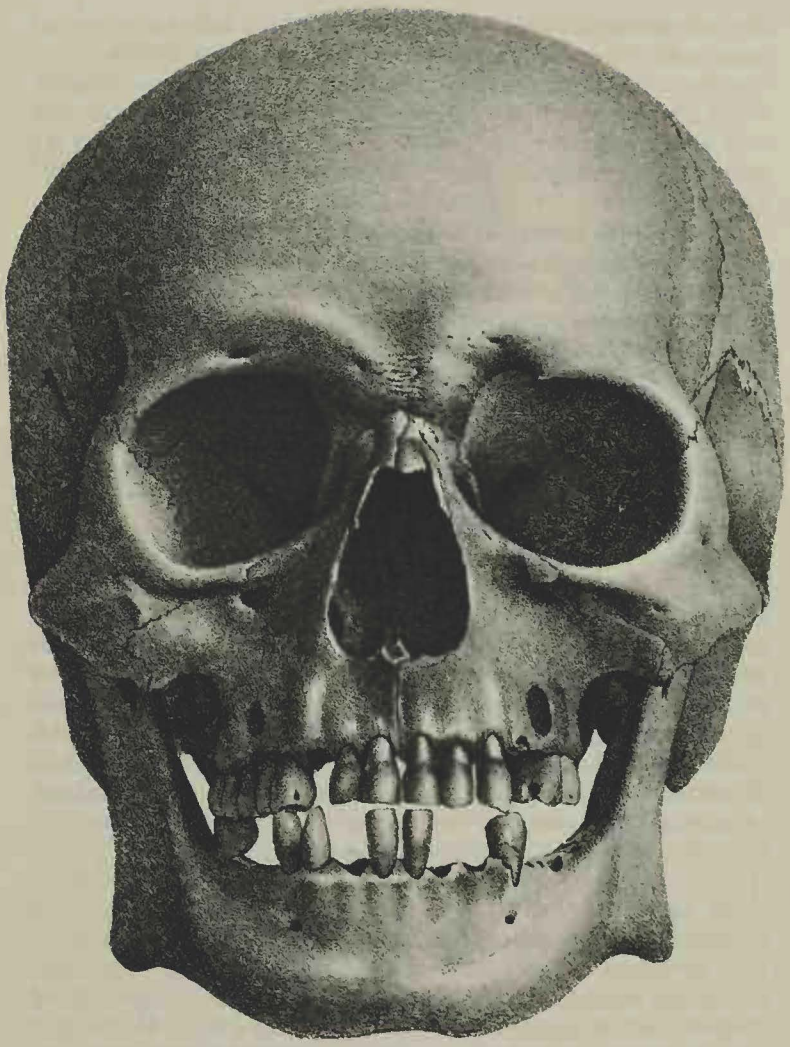
Morton's summary chart (Table 2.1) presents the "hard" argument of the *Crania Americana.* He had measured the capacity of 144 Indian skulls and calculated a mean of 82 cubic inches, a full 5 cubic inches below the Caucasian norm (Figs. 2.4 and 2.5). In addition, Morton appended a table of phrenological measurements indicating a deficiency of "higher" mental powers among Indians. "The benevolent mind," Morton concluded (p. 82), "may regret

*This account omits many statistical details of my analysis. The complete tale appears in Gould, 1978. Some passages in pp. 56–69 are taken from this article.

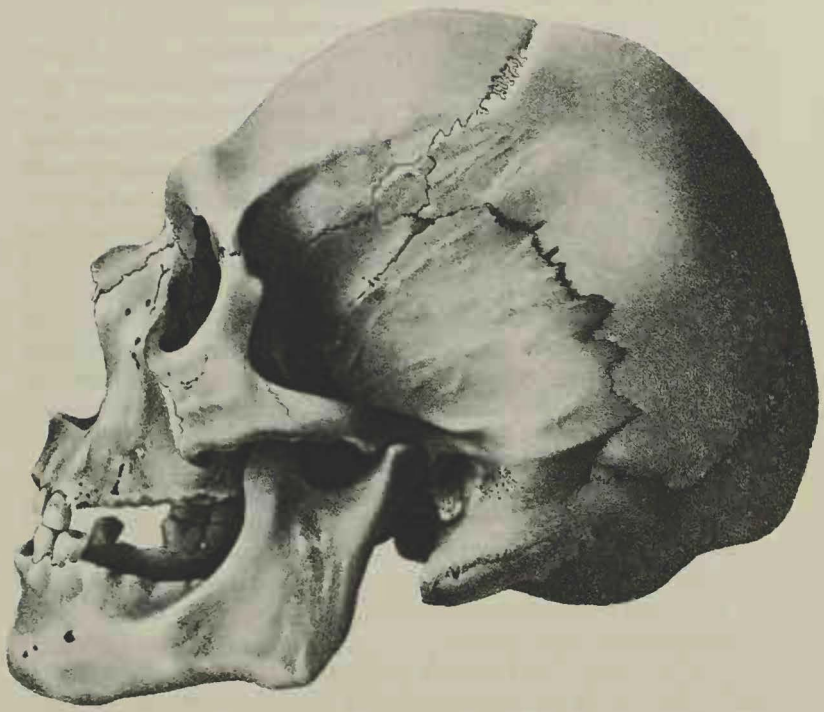
the inaptitude of the Indian for civilization," but sentimentality must yield to fact. "The structure of his mind appears to be different from that of the white man, nor can the two harmonize in the social relations except on the most limited scale." Indians "are not only averse to the restraints of education, but for the most part are incapable of a continued process of reasoning on abstract subjects" (p. 81).

Since *Crania Americana* is primarily a treatise on the inferior quality of Indian intellect, I note first of all that Morton's cited average of 82 cubic inches for Indian skulls is incorrect. He separated Indians into two groups, "Toltecans" from Mexico and South America, and "Barbarous Tribes" from North America. Eighty-two is the average for Barbarous skulls; the total sample of 144 yields a mean of 80.2 cubic inches, or a gap of almost 7 cubic inches between Indian and Caucasian averages. (I do not know how Morton made this elementary error. It did permit him, in any case, to retain the conventional chain of being with whites on top, Indians in the middle, and blacks on the bottom.)

But the "correct" value of 80.2 is far too low, for it is the result of an improper procedure. Morton's 144 skulls belong to many different groups of Indians; these groups differ significantly among themselves in cranial capacity. Each group should be weighted equally, lest the final average be biased by unequal size of subsamples. Suppose, for example, that we tried to estimate average human height from a sample of two jockeys, the author of this book (strictly middling stature), and all the players in the National Basketball Association. The hundreds of Jabbars would swamp the remaining three and give an average in excess of six and a half feet. If, however, we averaged the averages of the three groups (jockeys, me, and the basketball players), then our figure would lie closer to the true value. Morton's sample is strongly biased by a major overrepresentation of an extreme group—the small-brained Inca Peruvians. (They have a mean cranial capacity of 74.36 cubic inches and provide 25 percent of the entire sample). Large-brained Iroquois, on the other hand, contribute only 3 skulls to the total sample (2 percent). If, by the accidents of collecting, Morton's sample had included 25 percent Iroquois and just a few Incas, his average would have risen substantially. Consequently, I corrected this bias as best I could by averaging the mean values for all tribes



2•4 The skull of an Araucanian Indian. The lithographs of this and the next figure were done by John Collins, a great scientific artist unfortunately unrecognized today. They appeared in Morton's *Crania Americana* of 1839.



2•5 The skull of a Huron Indian. Lithograph by John Collins from Morton's *Crania Americana,* 1839.

represented by 4 or more skulls. The Indian average now rises to 83.79 cubic inches.

This revised value is still more than 3 cubic inches from the Caucasian average. Yet, when we examine Morton's procedure for computing the Caucasian mean, we uncover an astounding inconsistency. Since statistical reasoning is largely a product of the last one hundred years, I might have excused Morton's error for the Indian mean by arguing that he did not recognize the biases produced by unequal sizes among subsamples. But now we discover that he understood this bias perfectly well—for Morton calculated his high Caucasian mean by consciously eliminating small-brained Hindus from his sample. He writes (p. 261): "It is proper, however, to mention that but 3 Hindoos are admitted in the whole number, because the skulls of these people are probably smaller than those of any other existing nation. For example, 17 Hindoo heads give a mean of but 75 cubic inches; and the three received into the table are taken at that average." Thus, Morton included a large subsample of small-brained people (Inca Peruvians) to pull down the Indian average, but excluded just as many small Caucasian skulls to raise the mean of his own group. Since he tells us what he did so baldly, we must assume that Morton did not deem his procedure improper. But by what rationale did he keep Incas and exclude Hindus, unless it were the a priori assumption of a truly higher Caucasian mean? For one might then throw out the Hindu sample as truly anomalous, but retain the Inca sample (with the same mean as the Hindus, by the way) as the lower end of normality for its disadvantaged larger group.

I restored the Hindu skulls to Morton's sample, using the same procedure of equal weighting for all groups. Morton's Caucasian sample, by his reckoning, contains skulls from four subgroups, so Hindus should contribute one-fourth of all skulls to the sample. If we restore all seventeen of Morton's Hindu skulls, they form 26 percent of the total sample of sixty-six. The Caucasian mean now drops to 84.45 cubic inches, for no difference worth mentioning between Indians and Caucasians. (Eskimos, despite Morton's low opinion of them, yield a mean of 86.8, hidden by amalgamation with other subgroups in the Mongol grand mean of 83). So much for Indian inferiority.

The case of the Egyptian catacombs: Crania Aegyptiaca

Morton's friend and fellow polygenist George Gliddon was United States consul for the city of Cairo. He dispatched to Philadelphia more than one hundred skulls from tombs of ancient Egypt, and Morton responded with his second major treatise, the *Crania Aegyptiaca* of 1844. Morton had shown, or so he thought, that whites surpassed Indians in mental endowment. Now he would crown his story by demonstrating that the discrepancy between whites and blacks was even greater, and that this difference had been stable for more than three thousand years.

Morton felt that he could identify both races and subgroups among races from features of the skull (most anthropologists today would deny that such assignments can be made unambiguously). He divided his Caucasian skulls into Pelasgics (Hellenes, or ancient Greek forebears), Jews, and Egyptians—in that order, again confirming Anglo-Saxon preferences (Table 2.2). Non-Caucasian skulls he identified either as "negroid" (hybrids of Negro and Caucasian with more black than white) or as pure Negro.

Morton's subjective division of Caucasian skulls is clearly unwarranted, for he simply assigned the most bulbous crania to his favored Pelasgic group and the most flattened to Egyptians; he mentions no other criteria of subdivision. If we ignore his threefold separation and amalgamate all sixty-five Caucasian skulls into a single sample, we obtain an average capacity of 82.15 cubic inches. (If we give Morton the benefit of all doubt and rank his dubious subsamples equally—as we did in computing Indian and Caucasian means for the *Crania Americana*—we obtain an average of 83.3 cubic inches.)

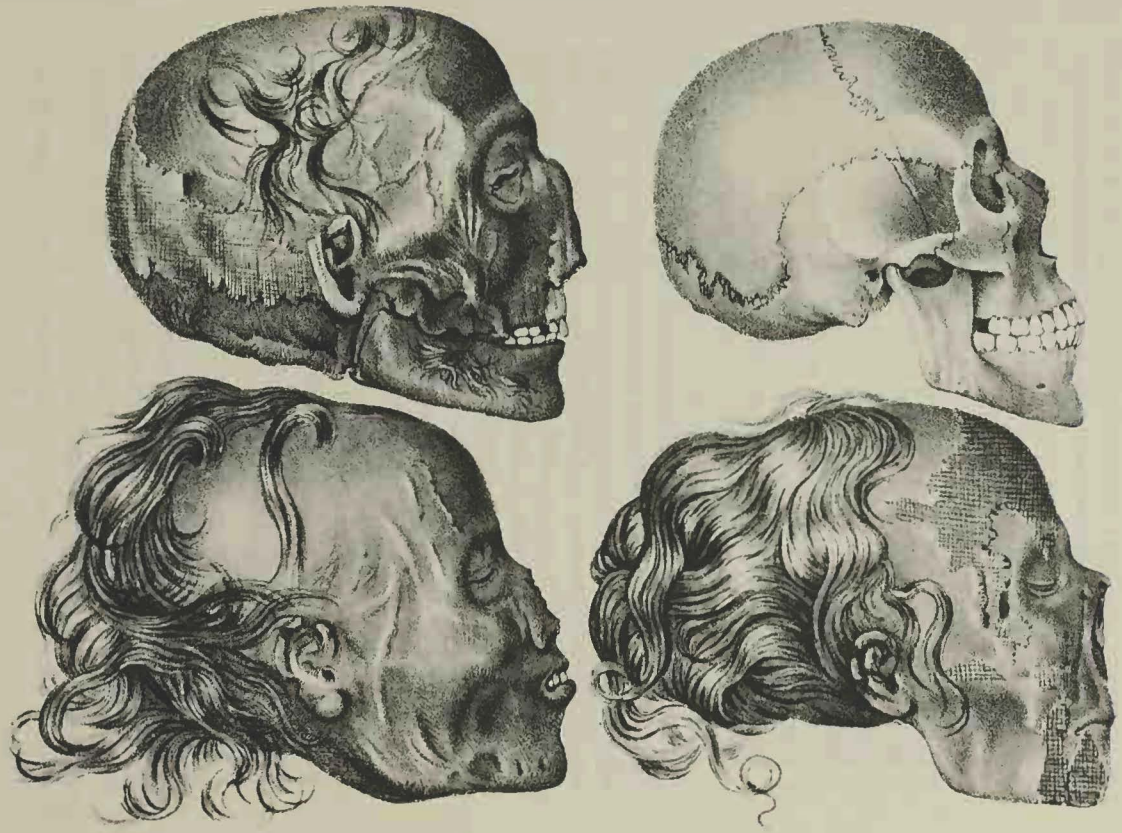
Either of these values still exceeds the negroid and Negro averages substantially. Morton assumed that he had measured an innate difference in intelligence. He never considered any other proposal for the disparity in average cranial capacity—though another simple and obvious explanation lay before him.

Sizes of brains are related to the sizes of bodies that carry them: big people tend to have larger brains than small people. This fact does not imply that big people are smarter—any more than elephants should be judged more intelligent than humans because their brains are larger. Appropriate corrections must be made for

differences in body size. Men tend to be larger than women; consequently, their brains are bigger. When corrections for body size are applied, men and women have brains of approximately equal size. Morton not only failed to correct for differences in sex or body size; he did not even recognize the relationship, though his data proclaimed it loud and clear. (I can only conjecture that Morton never separated his skulls by sex or stature—though his tables record these data—because he wanted so much to read differences in brain size directly as differences in intelligence.)

Many of the Egyptian skulls came with mummified remains of their possessors (Fig. 2.6), and Morton could record their sex unambiguously. If we use Morton's own designations and compute separate averages for males and females (as Morton never did), we obtain the following remarkable result. Mean capacity for twenty-four male Caucasian skulls is 86.5 cubic inches; twenty-two female skulls average 77.2 (the remaining nineteen skulls could not be identified by sex). Of the six negroid skulls, Morton identified two as female (at 71 and 77 cubic inches) and could not allocate the other four (at 77, 77, 87, and 88).* If we make the reasonable conjecture that the two smaller skulls (77 and 77) are female, and the two larger male (87 and 88), we obtain a male negroid average of 87.5, slightly above the Caucasian male mean of 86.5, and a female negroid average of 75.5, slightly below the Caucasian value of 77.2. The apparent difference of 4 cubic inches between Morton's Caucasian and negroid samples may only record the fact that about half his Caucasian sample is male, while only one-third the negroid sample may be male. (The apparent difference is magnified by Morton's incorrect rounding of the negroid average down to 79 rather than up to 80. As we shall see again, all of Morton's minor numerical errors favor his prejudices.) Differences in average brain size between Caucasians and negroids in the Egyptian tombs only record differences in stature due to sex, not variation in "intelligence." You will not be surprised to learn that the single pure Negro skull (73 cubic inches) is a female.

*In his final catalogue of 1849, Morton guessed at sex (and age within five years!) for all crania. In this later work, he specifies 77, 87, and 88 as male, and the remaining 77 as female. This allocation was pure guesswork; my alternate version is equally plausible. In the *Crania Aegyptiaca* itself, Morton was more cautious and only identified sex for specimens with mummified remains.



2 • 6 Skulls from the Egyptian catacombs. From Morton's *Crania Aegyptiaca* of 1844.

Table 2 • 4 Cranial capacity of Indian groups ordered by Morton's assessment of body stature

STATURE AND GROUP	CRANIAL CAPACITY (IN^3)	N
LARGE		
Seminole-Muskogee	88.3	8
Chippeway and related groups	88.8	4
Dacota and Osage	84.4	7
MIDDLE		
Mexicans	80.2	13
Menominee	80.5	8
Mounds	81.7	9
SMALL		
Columbia River Flatheads	78.8	10
Peruvians	74.4	33

The correlation of brain and body also resolves a question left hanging in our previous discussion of the *Crania Americana:* What is the basis for differences in average brain size among Indian peoples? (These differences bothered Morton considerably, for he could not understand how small-brained Incas had built such an elaborate civilization, though he consoled himself with the fact of their rapid conquest by the conquistadores). Again, the answer lay before him, but Morton never saw it. Morton presents subjective data on bodily statures in his descriptions of the various tribes, and I present these assessments along with average brain sizes in Table 2.4. The correlation of brain and body size is affirmed without exception. The low Hindu mean among Caucasians also records a difference in stature, not another case of dumb Indians.

The case of the shifting black mean

In the *Crania Americana,* Morton cited 78 cubic inches as the average cranial capacity for blacks. Five years later, in the *Crania Aegyptiaca,* he appended the following footnote to his table of measurements: "I have in my possession 79 crania of Negroes born in Africa. . . . Of the whole number, 58 are adult . . . and give 85 cubic inches for the average size of the brain" (1844, p. 113).

Since Morton had changed his method of measurement from

mustard seed to lead shot between 1839 and 1844, I suspected this alteration as a cause for the rising black mean. Fortunately, Morton remeasured most of his skulls personally, and his various catalogues present tabulations of the same skulls by both seed and shot (see Gould, 1978, for details).

I assumed that measures by seed would be lower. Seeds are light and variable in size, even after sieving. Hence, they do not pack well. By vigorous shaking or pressing of the thumb at the foramen magnum (the hole at the base of a skull), seeds can be made to settle, providing room for more. Measures by seed were very variable; Morton reported differences of several cubic inches for recalibrations of the same skull. He eventually became discouraged, fired his assistants, and redid all his measurements personally, with lead shot. Recalibrations never varied by more than a cubic inch, and we may accept Morton's judgment that measures by shot were objective, accurate, and repeatable—while earlier measures by seed were highly subjective and erratic.

I then calculated the discrepancies between seed and shot by race. Shot, as I suspected, always yielded higher values than seed. For 111 Indian skulls, measured by both criteria, shot exceeds seed by an average of 2.2 cubic inches. Data are not as reliable for blacks and Caucasians because Morton did not specify individual skulls for these races in the *Crania Americana* (measured by seed). For Caucasians, 19 identifiable skulls yield an average discrepancy of only 1.8 cubic inches for shot over seed. Yet 18 African skulls, remeasured from the sample reported in *Crania Americana,* produce a mean by shot of 83.44 cubic inches, a rise of 5.4 cubic inches from the 1839 average by seed. In other words, the more "inferior" a race by Morton's a priori judgment, the greater the discrepancy between a subjective measurement, easily and unconsciously fudged, and an objective measure unaffected by prior prejudice. The discrepancy for blacks, Indians, and Caucasians is 5.4, 2.2, and 1.8 cubic inches, respectively.

Plausible scenarios are easy to construct. Morton, measuring by seed, picks up a threateningly large black skull, fills it lightly and gives it a few desultory shakes. Next, he takes a distressingly small Caucasian skull, shakes hard, and pushes mightily at the foramen magnum with his thumb. It is easily done, without conscious motivation; expectation is a powerful guide to action.

Table 2 • 5 Corrected values for Morton's final tabulation

PEOPLE	CRANIAL CAPACITY (IN^3)
Mongolians	87
Modern Caucasians	87
Native Americans	86
Malays	85
Ancient Caucasians	84
Africans	83

The final tabulation of 1849

Morton's burgeoning collection included 623 skulls when he presented his final tabulation in 1849—an overwhelming affirmation of the ranking that every Anglo-Saxon expected.

The Caucasian subsamples suffer from errors and distortions. The German mean, reported at 90 in the summary, is 88.4 from individual skulls listed in the catalogue; the correct Anglo-American average is 89 (89.14), not 90. The high English mean of 96 is correct, but the small sample is entirely male.* If we follow our procedure of computing averages among subsamples, the six modern Caucasian "families" yield a mean of 87 cubic inches.† The ancient Caucasian average for two subsamples is 84 cubic inches (Table 2.5).

Six Chinese skulls provide Morton with a Mongolian mean of 82, but this low value records two cases of selective amnesia: First,

*To demonstrate again how large differences based on stature can be, I report these additional data, recovered from Morton's tabulations, but never calculated or recognized by him: 1) For Inca Peruvians, fifty-three male skulls average 77.5; sixty-one female skulls, 72.1. 2) For Germans, nine male skulls average 92.2; eight females, 84.3.

†My original report (Gould, 1978) incorrectly listed the modern Caucasian mean as 85.3. The reason for this error is embarrassing, but instructive, for it illustrates, at my expense, the cardinal principle of this book: the social embeddedness of science and the frequent grafting of expectation upon supposed objectivity. Line 7 in Table 2.3 lists the range of Semitic skulls as 84 to 98 cubic inches for Morton's sample of 3. However, my original paper cited a mean of 80—an obvious impossibility if the smallest skull measures 84. I was working from a Xerox of Morton's original chart, and his correct value of 89 is smudged to look like an 80 on my copy. Nonetheless, the range of 84 to 98 is clearly indicated right alongside, and I never saw the inconsistency—presumably because a low value of 80 fit my hopes for a depressed Caucasian mean. The 80 therefore "felt" right and I never checked it. I am grateful to Dr. Irving Klotz of Northwestern University for pointing out this error to me.

Morton excluded the latest Chinese specimen (skull number 1336 at 98 cubic inches), though it must have been in his collection when he published his summary because he includes many Peruvian skulls with higher numbers. Secondly, although Morton deplored the absence of Eskimos from his collection (1849, p. iv), he did not mention the three Eskimo skulls that he had measured for *Crania Americana*. (These belonged to his friend George Combe and do not appear in Morton's final catalogue.)

Morton never remeasured these skulls with shot, but if we apply the Indian correction of 2.2 cubic inches to their seed average of 86.8 we obtain a mean of 89. These two samples (Chinese with number 1336 added, and Eskimo conservatively corrected) yield a Mongolian average of 87 cubic inches.

By 1849 Morton's Indian mean had plummeted to 79. But this figure is invalid for the same reason as before, though now intensified—inequality of numbers among subsamples. Small-headed (and small-statured) Peruvians provided 23 percent of the 1839 sample, but their frequency had risen to nearly half (155 of 338 skulls) by 1849. If we use our previous criterion and compute the average of all subsamples weighted equally, the Indian average is 86 cubic inches.

For the Negro average, we should drop Morton's australoids because he wanted to assess the status of African blacks and we no longer accept a close relationship between the two groups—dark skin evolved more than once among human groups. I also drop the Hottentot sample of 3. All skulls are female, and Hottentots are very small in stature. Native and American-born blacks, amalgamated to a single sample, yield an average value between 82 and 83, but closer to 83.

In short, my correction of Morton's conventional ranking reveals *no* significant differences among races for Morton's own data (Table 2.5). All groups rank between 83 and 87 cubic inches, and Caucasians share the pinnacle. If western Europeans choose to seek their superiority in high averages for their subsamples (Germanics and Anglo-Saxons in the Caucasian tabulations), I point out that several Indian subsamples are equally high (though Morton amalgamated all North American Indians and never reported averages by subgroup), and that all Teutonic and Anglo-Saxon averages are either miscalculated or biased in Morton's table.

Conclusions

Morton's finagling may be ordered into four general categories:

1. Favorable inconsistencies and shifting criteria: Morton often chose to include or delete large subsamples in order to match group averages with prior expectations. He included Inca Peruvians to decrease the Indian average, but deleted Hindus to raise the Caucasian mean. He also chose to present or not to calculate the averages of subsamples in striking accord with desired results. He made calculations for Caucasians to demonstrate the superiority of Teutons and Anglo-Saxons, but never presented data for Indian subsamples with equally high averages.

2. Subjectivity directed toward prior prejudice: Morton's measures with seed were sufficiently imprecise to permit a wide range of influence by subjective bias; later measures with shot, on the other hand, were repeatable, and presumably objective. In skulls measured by both methods, values for shot always exceed values for the light, poorly packing seed. But degrees of discrepancy match a priori assumptions: an average of 5.4, 2.2, and 1.8 cubic inches for blacks, Indians, and whites, respectively. In other words, blacks fared poorest and whites best when the results could be biased toward an expected result.

3. Procedural omissions that seem obvious to us: Morton was convinced that variation in skull size recorded differential, innate mental ability. He never considered alternate hypotheses, though his own data almost cried out for a different interpretation. Morton never computed means by sex or stature, even when he recorded these data in his tabulations—as for Egyptian mummies. Had he computed the effect of stature, he would presumably have recognized that it explained all important differences in brain size among his groups. Negroids yielded a lower average than Caucasians among his Egyptian skulls because the negroid sample probably contained a higher percentage of smaller-statured females, not because blacks are innately stupider. The Incas that he included in the Indian sample and the Hindus that he excluded from the Caucasian sample both possessed small brains as a consequence of small body size. Morton used an all-female sample of three Hottentots to support the stupidity of blacks, and an all-male sample of Englishmen to assert the superiority of whites.

4. Miscalculations and convenient omissions: All miscalculations and omissions that I have detected are in Morton's favor. He rounded the negroid Egyptian average down to 79, rather than up to 80. He cited averages of 90 for Germans and Anglo-Saxons, but the correct values are 88 and 89. He excluded a large Chinese skull and an Eskimo subsample from his final tabulation for mongoloids, thus depressing their average below the Caucasian value.

Yet through all this juggling, I detect no sign of fraud or conscious manipulation. Morton made no attempt to cover his tracks and I must presume that he was unaware he had left them. He explained all his procedures and published all his raw data. All I can discern is an a priori conviction about racial ranking so powerful that it directed his tabulations along preestablished lines. Yet Morton was widely hailed as the objectivist of his age, the man who would rescue American science from the mire of unsupported speculation.

The American school and slavery

The leading American polygenists differed in their attitude toward slavery. Most were Northerners, and most favored some version of Squier's quip: "[I have a] precious poor opinion of niggers . . . a still poorer one of slavery" (in Stanton, 1960, p. 193).

But the identification of blacks as a separate and unequal species had obvious appeal as an argument for slavery. Josiah Nott, a leading polygenist, encountered particularly receptive audiences in the South for his "lectures on niggerology" (as he called them). Morton's *Crania Aegyptiaca* received a warm welcome in the South (in Stanton, 1960, pp. 52–53). One supporter of slavery wrote that the South need no longer be "so much frightened" by "voices of Europe or of Northern America" in defending its "peculiar institutions." When Morton died, the South's leading medical journal proclaimed (R. W. Gibbs, *Charleston Medical Journal,* 1851, quoted in Stanton, 1960, p. 144): "We of the South should consider him as our benefactor, for aiding most materially in giving to the negro his true position as an inferior race."

Nonetheless, the polygenist argument did not occupy a primary place in the ideology of slavery in mid-nineteenth-century America—and for a good reason. For most Southerners, this excellent argument entailed too high a price. The polygenists had railed

against ideologues as barriers to their pure search for truth, but their targets were parsons more often than abolitionists. Their theory, in asserting a plurality of human creations, contradicted the doctrine of a single Adam and contravened the literal truth of scripture. Although the leading polygenists held a diversity of religious attitudes, none were atheists. Morton and Agassiz were conventionally devout, but they did believe that both science and religion would be aided if untrained parsons kept their noses out of scientific issues and stopped proffering the Bible as a document to settle debates in natural history. Josiah Nott stated his goal in a forceful way (Agassiz and Morton would not have put it so baldly): ". . . to cut loose the natural history of mankind from the Bible, and to place each upon its own foundation, where it may remain without collision or molestation" (in Stanton, 1960, p. 119).

The polygenists forced defenders of slavery into a quandary: Should they accept a strong argument from science at the cost of limiting religion's sphere? In resolving this dilemma, the Bible usually won. After all, scriptural arguments for supporting slavery were not wanting. Degeneration of blacks under the curse of Ham was an old and eminently functional standby. Moreover, polygeny was not the only quasi-scientific defense available.

John Bachman, for example, was a South Carolina parson and prominent naturalist. As a committed monogenist, he spent a good part of his scientific career attempting to refute polygeny. He also used monogenist principles to defend slavery:

> In intellectual power the African is an inferior variety of our species. His whole history affords evidence that he is incapable of self-government. Our child that we lead by the hand, and who looks to us for protection and support is still of our own blood notwithstanding his weakness and ignorance (in Stanton, 1960, p. 63).

Among nonpolygenist, "scientific" defenses of slavery, no arguments ever matched in absurdity the doctrines of S. A. Cartwright, a prominent Southern physician. (I do not cite these as typical and I doubt that many intelligent Southerners paid them much attention; I merely wish to illustrate an extreme within the range of "scientific" argument.) Cartwright traced the problems of black people to inadequate decarbonization of blood in the lungs (insufficient removal of carbon dioxide): "It is the defective . . . atmospherization of the blood, conjoined with a deficiency of cerebral

matter in the cranium . . . that is the true cause of that debasement of mind, which has rendered the people of Africa unable to take care of themselves" (from Chorover, 1979; all quotes from Cartwright are taken from papers he presented to the 1851 meeting of the Louisiana Medical Association.)

Cartwright even had a name for it—*dysesthesia,* a disease of inadequate breathing. He described its symptoms in slaves: "When driven to labor . . . he performs the task assigned to him in a headlong and careless manner, treading down with his feet or cutting with his hoe the plants he is put to cultivate—breaking the tools he works with, and spoiling everything he touches." Ignorant Northerners attributed this behavior to "the debasing influence of slavery," but Cartwright recognized it as the expression of a true disease. He identified insensibility to pain as another symptom: "When the unfortunate individual is subjected to punishment, he neither feels pain of any consequence . . . [nor] any unusual resentment more than stupid sulkiness. In some cases . . . there appears to be an almost total loss of feeling." Cartwright proposed the following cure:

> The liver, skin and kidneys should be stimulated to activity . . . to assist in decarbonizing the blood. The best means to stimulate the skin is, first, to have the patient well washed with warm water and soap; then to anoint it all over with oil, and to slap the oil in with a broad leather strap; then to put the patient to some hard kind of work in the open air and sunshine that will compel him to expand his lungs, as chopping wood, splitting rails, or sawing with the crosscut or whip saw.

Cartwright did not end his catalogue of diseases with dysesthesia. He wondered why slaves often tried to flee, and identified the cause as a mental disease called *drapetomania,* or the insane desire to run away. "Like children, they are constrained by unalterable physiological laws, to love those in authority over them. Hence, from a law of his nature, the negro can no more help loving a kind master, than the child can help loving her that gives it suck." For slaves afflicted with drapetomania, Cartwright proposed a behavioral cure: owners should avoid both extreme permissiveness and cruelty: "They have only to be kept in that state, and treated like children, to prevent and cure them from running away."

The defenders of slavery did not need polygeny. Religion still

stood above science as a primary source for the rationalization of social order. But the American debate on polygeny may represent the last time that arguments in the scientific mode did not form a first line of defense for the status quo and the unalterable quality of human differences. The Civil War lay just around the corner, but so did 1859 and Darwin's *Origin of Species*. Subsequent arguments for slavery, colonialism, racial differences, class structures, and sex roles would go forth primarily under the banner of science.

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