9 The beautiful skulls of Schiller and the Georgian girl

Quantitative and aesthetic scaling of the races, 1770–1850

Robert J. Richards

Isak Dinesen, in one of her gothic tales about art and memory, spins a story of a nobleman's startling recognition of a prostitute he once loved and abandoned. He saw her likeness in the beauty of a young woman's skull used by an artist friend.

> After we had discussed his pictures, and art in general, he said that he would show me the prettiest thing that he had in his studio. It was a skull from which he was drawing. He was keen to explain its rare beauty to me. "It is really," he said, "the skull of a young woman [. . .]." The white polished bone shone in the light of the lamp, so pure. And safe. In those few seconds I was taken back to my room [. . .] with the silk fringes and the heavy curtains, on a rainy night of fifteen years before.
>
> (Dinesen 1991, 106–107)[1]

The skulls pictured in Figure 9.1 have also been thought rare beauties and evocative of something more. On the left is the skull of a nameless, young Caucasian female from the Georgian region. Johann Friedrich Blumenbach, the great anatomist and naturalist, celebrated this skull, prizing it because of "the admirable beauty of its formation" (*bewundernswerthen Schönheit seiner Bildung*). He made the skull an aesthetic standard, and like the skull in Dinesen's tale, it too recalled a significant history (Blumenbach 1802, no. 51). She was a young woman captured during the Russo-Turkish war (1787–1792) and died in prison; her dissected skull had been sent to Blumenbach in 1793 (Dougherty and Klatt 2006–2015, IV, 256–257). On the right is the skull of Friedrich Schiller, the famous German poet, as represented by Carl Gustav Carus, premier anatomist and artist of the early nineteenth century. Though Immanuel Kant had a large, powerful skull, Carus did not think it beautiful (Carus 1845, Tafel 1). He regarded the beauty of Schiller's skull as an index of harmonious intellectual and artistic accomplishment.

These skulls and others were used to scale the human races during the late eighteenth and early nineteenth centuries. The period had seen a number of such attempts, which applied a variety of metrics: the relation of the width to the length of the skull; the dimensions of its bony plates; the so-called facial angle; the internal cranial capacity of the skull, essentially a proxy for the size of the brain. Some of these studies, as well as their successors – for instance, Francis Galton's

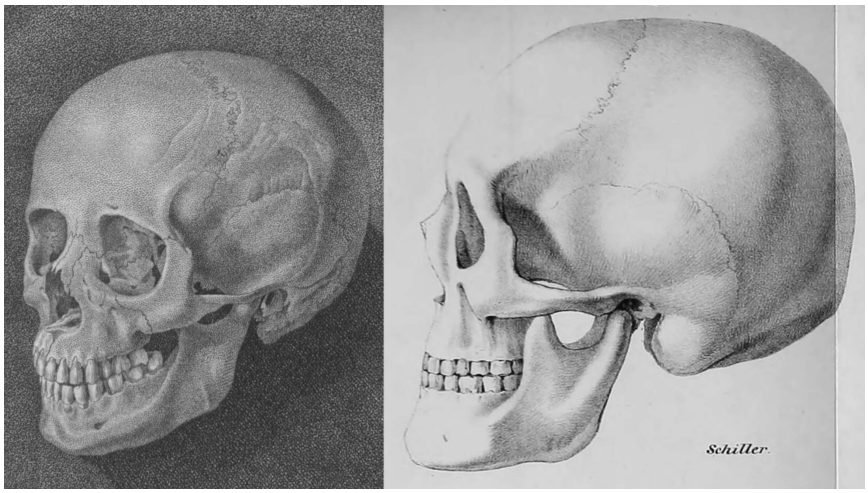

Figure 9.1 On the left, the skull of the Georgian female (from Blumenbach 1802); on the right, the skull of Friedrich Schiller (from Carus 1841).

superimposed photographs of social types, Nazi portrayals of racial types, William Sheldon's classification of body types (ectomorph, mesomorph, endomorph) – assumed that the scientific study of external, physical features would reveal psychological, intellectual, and moral characteristics. But the mathematics of skulls was not the only measure used. Surprisingly another criterion, as exemplified by the skulls of the Georgian female and Schiller, was aesthetic: the proportions, the symmetry, and the *je-ne-sais-quoi* of beauty.

Those researchers who studied skulls formed two distinct groups at the turn of the eighteenth century. One group argued that the physical features of skulls – including their aesthetic qualities – represented different human types and were permanent, revealing the mental characteristics of the several races; such physical distinctions permitted the scaling of the races into higher and lower in regard to intelligence, talent, and moral disposition. The other group also made careful measurements of the physical features of skulls – again, including judgments of beauty – but the members of this group contended that such features were impermanent and variable. They maintained that no hierarchical differences of intellect or morals could be detected among the races. What explains the different conclusions reached by the two groups? The same criteria and comparable methods of measurement were used by both, but their judgments made about the races were startlingly different. Can anything systematic be said about what led to these contrary results? I especially wish to focus on the criterion of beauty: what is a beautiful skull? Why should a beautiful skull tell you anything about the qualities of a person or race? These are the principal questions I will pursue in this essay; and they are not merely historical curiosities, since aesthetic traits today continue to

be used as markers of race and are embraced in evolutionary and cultural theories. Beauty, as these skulls show, is more than skin deep.

After some preliminary considerations of the social context and racial classifications, I will attend to four representative craniologists: Friedrich Tiedemann, Samuel George Morton, Johann Friedrich Blumenbach, and Carl Gustav Carus. Both Tiedemann and Morton took exacting measurements of skulls, especially cranial capacity. Tiedemann's pioneering work on skull measurement became part of the evidence used in the slavery debates that occurred in England and Germany; he argued that the races differed little in terms of cranial size. Morton, who amassed a large collection of skulls, contended that the races demonstrated different capacities and could be arranged in a hierarchy. Blumenbach thought aesthetic qualities of skulls distinguished the races, though racial features were nonetheless quite variable and subject to environmental alteration. Carus also believed the skulls of the various races – and the skulls of individuals – differed by reason of aesthetic qualities, but those qualities and other metric features were relatively unchanging. After about 1850, the literature crackled with skulls, but most of these studies were variations on and extensions of the examinations conducted by these four naturalists (David and Thurman 1867; Engel 1851; Huschke 1854; Meigs 1857; Zeune 1846).

The social and conceptual context

Travels of adventure and trade

Several social and conceptual events helped focus interest on skull measurement during the late eighteenth and early nineteenth centuries. Travel and trade had increased significantly during the last half of the eighteenth century, bringing Europeans into contact with other peoples. Captain James Cook, for example, made three famous trips to the islands of the South Pacific, New Zealand, and Australia (1768–1771, 1772–1775, 1776–1779), and brought back unusual plants and animals, as well as tales of exotic, aboriginal peoples. The trading companies formed in the seventeenth and eighteenth centuries – especially the British East India Company and the Dutch East and West India Companies – brought Europeans into contact with a variety of different populations. The Dutch East India Company (1602–1799), for instance, carried around 975,000 merchants, traders, and workers to Indonesia, India, Ceylon, Japan, China, Vietnam, and the islands in the South China Sea; many returned to Europe with tales of the inhabitants of those foreign shores (de Vries and van der Woude 1997, 75). These tales, of course, stimulated curiosity about the range and character of the different human groups and their relation to the man-like apes discovered in Africa and the Indies.

Slavery made poignant the question of the level of humanity found in Africa, in the Americas, and in other regions of the newly explored globe. During the eighteenth century, the number of slaves carried by European ships (Dutch, British, Portuguese, and French) reached about six million individuals (Lovejoy 1982, 473–501). Both slavers and abolitionists, at least those of a sensitive nature, had

elevated interests in the more theoretical question of the intellectual and moral status of Africans. In the newly established United States of America, as the Native Americans were pushed further west, the same question of justification for wretched treatment arose.

The interest in skulls

The two most important reasons for the focus on skulls in scaling the human races are quite simple: skulls encase that part regarded as the essence of the human, the brain; skulls thus evoke who we are or were – think of Dinesen's story of the young woman's skull or Hamlet's address to the skull of Yorick, a fellow of infinite jest. The skull always carries the ineradicable whiff of mortality, awakening that deeply seated fear we always carry; it thus evokes fascination and apprehension. The other reason for interest in skulls, equally important for natural science at the turn of the eighteenth century: skulls can be measured.

The great advance in science since the beginning of the Enlightenment has come through precise measurement, the mathematizing of the world picture. The historian of science Charles Gillispie has argued that disciplines became objective and thus truly scientific only when they became quantitative (Gillispie 1960). While Gillispie's criterion would leave a great deal out of the history of science that most individuals would regard as scientific, his view was quite compatible with that of Kant, whose theoretical considerations weighed heavily with German naturalists. Kant famously contended, "in every particular doctrine of nature only so much proper science can be met as there is mathematics therein" (Kant 1956, V, 14 [A IX]). Skulls could be mathematized – and they traveled well.

Classification of the races

Linnaeus's classification

In the mid-eighteenth century, Carl von Linné, the great Swedish naturalist, put graphic order into the hidden order of nature. In the first edition (1735) of his *Systema Naturae*, he divided the natural world into three kingdoms: mineral, plant, and animal. He introduced what became the standard nomenclature by which to identify plants and animals – that is, the taxonomic categories of class, order, genus, species, and variety. He placed humans in the class of *Quadrupedia*, the order of *Anthropomorpha* (also including simians – apes and monkeys – and sloths), and in the genus *Homo*, with four species: *H. Europaeus* (white), *H. Americanus* (red), *H. Asiaticus* (dark), and *H. Africanus* (black) (Linnaeus 1740, 44). By the highly revised tenth edition of his work (1758–1759), Linnaeus markedly changed his classification scheme. He replaced the class name *Quadrupedia* with *Mammalia* and changed *Anthropomorpha* to *Primates*. He divided the order of primates into four genera: *Homo*, *Simia*, *Lemur*, and *Vespertilio* (bats). The genus *Homo* now had two species, H. sapiens and H. troglodytes (caveman or, as he was also termed, "man of the night") – the latter included the subspecies Orang

Outang and Kakurlacko (perhaps a gibbon). The species *H. sapiens* had six varieties: *H. Americanus*, *H. Europaeus*, *H. Asiaticus*, *H. Africanus*, *H. Ferus* (wild man – chimpanzee?), and *H. Monstrosus* (macrocephalics, etc.). The first four human racial varieties, the ones that survived Linnaeus's classification scheme, carried several descriptors, including a too-neat application of the four Hippocratic temperaments: the Americans were red, choleric, straight-standing, and governed by custom; the Europeans were white, sanguine, muscular, and governed by law; the Asians were dark, melancholic, stiff, and governed by opinion; and the Africans were black, phlegmatic, languid, and governed by caprice (Linnaeus 1758–1759, I, 20–24).

Blumenbach's scheme

Blumenbach, in his doctoral dissertation – *De generis humani varietate nativa* (1775; *On the Natural Variety of Humankind*) – initially adopted the fourfold division of the human races established by Linnaeus (Blumenbach 1775, 41–42), and he insisted upon a basic principle: the unity of humankind (Blumenbach 1775, 40–41). Using Georges-Louis Leclerc de Buffon's criterion of hybrid fertility as an indicator of membership in a particular species, Blumenbach represented humans as forming four varieties of a single species. He also constructed their geographical boundaries somewhat differently from Linnaeus – for instance, he included among the European group individuals living just west of the Ganges River (thus including Indians and, further north, the Caucasians); the Mongolian group he made to include Native Americans living in the northwest areas of the American continent. He later added, in his *Handbuch der Naturgeschichte* (1779–1780; Handbook of natural history), one more variety or race: the south Asian and Polynesian (later called the Malay). During the late eighteenth and early nineteenth centuries, Blumenbach's fivefold division of the races became standard.

All men, according to Blumenbach, descended from Adam and Eve, and thus formed a unity; but because of environmental forces, they developed into five varieties or races. The closest to the original progeny were the Caucasians, whom he named after the Caucasus Mountains, today on the border of Georgia and Russia. They were "the original and greatest race," of white skin color, which must have been the original color of men. He supposed that the skin color of the original group had been white since it would be easier to transition from white to other skin colors than the reverse (Blumenbach 1795, 303). In appearance, the Caucasians were "according to our judgment of symmetry, the most beautiful and the best formed of men" (Blumenbach 1795, 289). The other races showed dominant characteristics: the Asiatics, with yellow-brown coloring, flat face, and small eyes; the Africans, of black color, wooly hair, squat nose, and full lips; the Americans, of copper-red color; and the South Asians and Polynesians (i.e., the Indonesians and Filipinos) with dark hair and light brown skin (Blumenbach 1779–1780, I, 63–64). The differences among men, according to Blumenbach, shaded into one another, so that the pale white skin at one end of the spectrum in the German

population transitioned to the red skin of the Americans at the other end, and so through the other populations; the same gradations could be found in stature and other features. The various groups displayed predominant traits by reason of particular environmental forces but expressed features just as variegated as the distinctive nutrition and climate of those environments and the diverging customs of the peoples. He thought Linnaeus's monstrous men (e.g., albinos) were mostly men suffering from some disease, and the troglodytes were confections of tales about matings of men and orangutans (Blumenbach 1779, I, 63–64).

In the first edition (1775) of his treatise *De generis humani varietate nativa*, Blumenbach, following Buffon, assumed that climate, nutrition, and habit had altered originally created stocks of animals and men, producing the varieties of species then populating the earth. But in the second edition of his treatise (1781b, 1–2), he introduced an additional, explanatory factor, the *Bildungstrieb* (formative drive). This was an independent vital agency, which he postulated initially to explain the epigenetic formation of the fetus, as opposed to the supposition that the fetus was already preformed, a kind of miniature adult that had only to unroll (*evolvere*) (Blumenbach 1781a). This force also accounted for the regular growth, maintenance, and repair of the individual, functions that could not be given a simple, mechanistic interpretation. He regarded this power as comparable to Newton's gravitational force – a power postulated to explain phenomena, even though the ultimate cause remained obscure. Blumenbach thought the *Bildungstrieb* could thus explain general species structures, but additionally supposed that it could be deflected from its regular operations by different climates, diets, and habits; the force, in concert with the environment, should thus be regarded as "the mother of varieties properly so called" (Blumenbach 1795, 88). The concept of the *Bildungstrieb* became a staple in German biology at the end of the eighteenth century, being adopted by the likes of Johann Wolfgang von Goethe, Johann Gottfried Herder, Alexander von Humboldt, and even Kant (Richards 2002, 216–37).

Through the latter part of the eighteenth century, the classification of the races and the nature of racial traits grew in moral urgency along with the escalation of the slave trade. In Britain and the new American nation, various abolition movements brought the moral question constantly before the public.

The quantitative analysis of skulls

Tiedemann and slavery

The German lands were not engaged in the slave trade, and many prominent Germans (e.g., Alexander von Humboldt, Friedrich Blumenbach, and Georg Forster) expressed indignation at its evils. Friedrich Tiedemann (Figure 9.2), a liberally inclined anatomy professor at Heidelberg, deployed not a philosophical argument against slavery but a scientific argument: he measured skulls.

Tiedemann was born in 1781 into a professorial family; his father, Dietrich Tiedemann, was a professor of philosophy in Cassel and an opponent of Kant. At the time, Cassel had a small Negro population, some arriving in the

Figure 9.2 Friedrich Tiedemann (1781–1861). Lithograph (from Schott 1836).

mid-seventeenth century and others a century later from the United States, families of individuals who had fought with the Hessian allies of the British during the American Revolutionary War (Jones 2013). Tiedemann would quite likely have been acquainted with individuals of this group. He studied medicine at Bamberg, Würzburg, and Marburg, receiving his degree from the latter in 1804. During a three-year itinerant period, he came to study with Blumenbach at Göttingen, the philosopher Friedrich Wilhelm Joseph Schelling at Würzburg, and the zoologist Georges Cuvier at Paris. Along the way, he heard lectures from Franz Joseph Gall,

who argued for a close connection between configurations of the skull and mental traits – the foundations for his doctrine of phrenology. The anatomist Samuel Thomas Soemmerring recommended this extraordinarily talented naturalist for a position at Landshut (in southeast Bavaria), where he stayed for ten years, focusing his attention on comparative anatomy. In 1816, he received a call from Heidelberg, where he happily spent the rest of his professional life, some thirty-three years.

While at Landshut, Tiedemann conducted studies of brain development, using two approaches that allowed him to move beyond description to explanation: comparative anatomy, on the one hand, and studies of the development of the human fetal brain on the other. He regarded this latter as "the thread of Ariadne for this Labyrinth" (Tiedemann 1816, 2). Following that thread led him to a cautious statement of a natural law of human development: the human fetal brain in its growth recapitulates the stages of brain structures represented by the series of animals from lowest to highest (Tiedemann 1816, 148). So, for example, though the thickness of the spinal cord in relation to the cerebrum of the human adult is quite small relative to that of other animals, in the early fetus it is relatively large but gradually diminishes in size comparable to the narrowing of the cord when one passes from fish, to amphibians, to birds, and finally to mammals (Tiedemann 1816, 91–92). Tiedemann likely would have been familiar with recapitulation theory at Würzburg, especially in his interactions with Schelling and the naturalist Lorenz Oken.[2] Tiedemann's own attachment to this conception directed him to that "daring adventure of reason" of which Kant spoke – namely, an evolutionary hypothesis about the origins of life on earth.[3] The developmental and comparative focus of German zoologists like Tiedemann in the early nineteenth century made the acceptance of Darwin's theory later in the century much smoother than in other European countries, including England.

Tiedemann insisted that human physiology was an experiential science (*Erfahrungs-Wissenschaft*), a science in which one gathered facts through systematic observation and performed experiments to discover their causes. "In observation we listen to nature, as it were; in experimentation we ask nature for advice." The attentive ear was important since many false moves arose from being in thrall to a "favorite theory" (*Lieblings-Theorie*). Any speculations had to be tested by experience (Tiedemann 1830, I, 9–11). Tiedemann brought this exacting experimental attitude to the study of human skulls. He wished to test whether there were significant differences among the races that might indicate differences in intellect, talent, and moral capacity. His first publication on the comparative anatomy of skulls came, quite surprisingly, in English: a paper read before the Royal Society of London, "On the Brain of the Negro," and printed in the *Transactions* of the Society in 1836 (Tiedemann 1836). The paper had been originally sent to the journal in 1835. Shortly thereafter, in 1837, he published a small book in German on the same subject but with a larger set of data and an extended analysis (Tiedemann 1837).

Pertinent and enduring conclusions came forth from Tiedemann's extensive study – ultimately of some 430 skulls (Figure 9.3). Among those conclusions

1) Dafs die Schädelhöhle zwischen 59 Unzen, bei einem Amerikaner, und 13 Unzen, bei einem Mongolen, spielte.

2) Dafs die Geräumigkeit der Schädelhöhle von 430 Männern aller Menschen-Rassen bei der gröfsten Anzahl zwischen 42 und 32 Unzen betrug, und zwar

unter	70	Männern	der Aethiopischen	Rasse	bei 64
—	186	—	— Kaukasischen	—	— 144
—	45	—	— Mongolischen	—	— 29
—	31	—	— Amerikanischen	—	— 20
—	98	—	— Malaïschen	—	— 63

3) Dafs eine Schädelhöhle, mehr als 42 Unzen haltend vorkam

bei	5	Männern	der Aethiopischen Rasse
—	42	—	— Kaukasischen —
—	10	—	— Mongolischen —
—	7	—	— Amerikanischen —
—	21	—	— Malaïschen —

Figure 9.3 Summary table from Tiedemann's *Hirn des Negers* (1837), showing (1) that the range of seed weights, used as an index of skull volumes for 430 skulls, was 59 ounces for a Native American to 13 ounces for an Asian; (2) that the largest number of skulls had a range between 42 and 32 ounces (e.g., the seventy males of the Ethiopian races having sixty-four individuals within that range, etc.); and (3) that of the races, those exceeding 42 ounces were Negros at five individuals, Caucasians at forty-two, Asians at ten, Native Americans at seven, and Malays at twenty-one.

were: the brain, relative to body size, is largest during infancy and reaches its mature size in humans at about the seventh to the eighth years of age (we would now say tenth to twelfth years); brain size is generally proportional to body size, though with great variation; females, having smaller bodies, tend to have slightly smaller brains than males – though in relation to body size, slightly larger brains. Tiedemann dissented vigorously from the racial evaluations of Peter Camper, Cuvier, and especially Soemmerring, each of whom held that the Negro brain was more like that of the orangutan than that of the European. Tiedemann found no morphological differences between the Negro brains and the European brains that he dissected. Brain size, however, was less easy to determine and might be different. Size was the crucial factor since there was, as he thought, "a very close connexion between the absolute size of the brain and the intellectual powers and functions of the mind" (Tiedemann 1836, 502). Soemmerring placed the African skull at the diminished end of the series running from the European to the Asiatic to the African (Sömmerring 1785, 19). His study, though, was quite circumscribed. His investigations of the Negro body relied on one female and a couple of males that he dissected at Cassel. Tiedemann's sample was vastly larger and the measurements more than eyeballing. His conclusion: "our investigation demonstrates undeniably that those anatomists and naturalists have been

caught in error who have attributed to the Negro a cranial cavity of less volume and a smaller brain than the Europeans and the peoples of other human races" (Tiedemann 1837, 47).

Tiedemann used a fairly simple method of determining cranial capacity. He first weighed skulls of different races and genders, as well as the skulls of apes; he then filled the cranial cavities with millet seed and weighed the skulls again. By subtracting the results, he got the size of brains as weighed in millet seeds. He found that most of the individual skulls of each of the five races – Ethiopian, Caucasian, Mongolian, American, and Malay – could be found in a range of 42–32 troy ounces. He also noted the number of skulls that exceeded 42 ounces (see Figure 9.3). Tiedemann concluded rather carefully, "The cranial cavity and the brain of all the human races show a similar middling size, within certain fluctuating limits." Thus, the majority of the sampled individuals of each race lay within the 42- to 32-ounce range. The next sentence, however, seemingly qualifies his results: "The most that can be shown is that among the peoples of the Caucasian and Malay races, according to the facts I've laid out, some men more often achieve a considerable size than with the peoples of the other races" (Tiedemann 1837, 47). His phrase "most that can be shown" is borne out by the figures: 5/70ths of the Negro skulls (about 7%) but 42/186ths of the Caucasian skulls (about 23%) and 21/98ths of the Malay skulls (about 21%) were over 42 ounces.[4]

Carus, who believed there were permanent differences separating the races, critically noticed that Tiedemann's own figures showed that the number of Negro skulls in the sample that exceeded 40 ounces amounted to 6 of 54, or about 11%, while the number of Caucasian skulls over 40 ounces was 64 of 141, or about 45% (Carus 1841, 12). Read that way, the portion of big-skulled Caucasians stands out, a jutting conclusion of which Tiedemann seems to have been aware. In anticipation, Tiedemann provided some mitigating considerations. He suggested, for instance, that the bodies of Negros were generally of smaller stature than those of Caucasians; thus, relative to body size the two groups of skulls simply did not differ that much – though Tiedemann admitted to not having exact figures. He also observed that slaves, whose skulls generally constituted the bulk of the Negro numbers, were usually taken from coastal areas of Africa, where the blacks lived a more degraded life than in the highlands. He also mentioned the case studies made by his old teacher Blumenbach of Negros who had achieved considerable intellectual renown in theology, philosophy, poetry, and science.

Samuel George Morton, the American measurements

The best-known quantitative effort to scale race in the nineteenth century is that of Samuel George Morton (Figure 9.4), a Philadelphia physician and naturalist. During his own time, numerous researchers – Louis Agassiz, Paul Broca, and Carl Gustav Carus – as well as Southern slave owners admired his work and used his skull measurements as evidence of racial hierarchy. Even Alexander von Humboldt, no friend of slavery, sent a letter of congratulations upon receipt of Morton's principal study of skulls, *Crania Americana* (1839); the German adventurer prized the "profundity of its anatomical views" rendered without "poetical

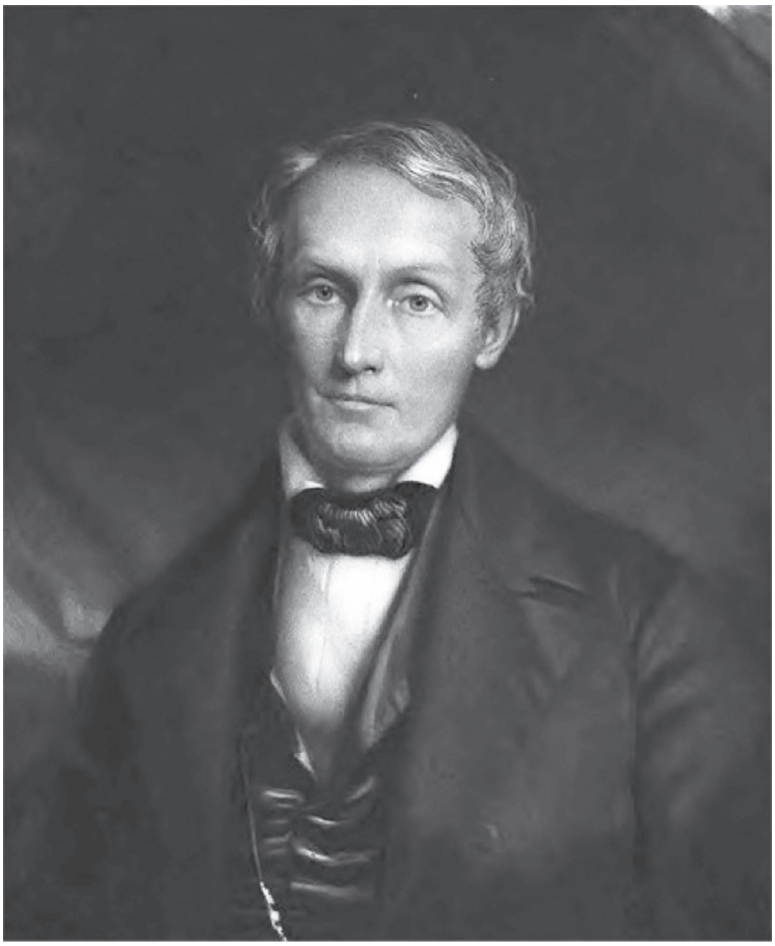

Figure 9.4 Samuel George Morton (1799–1851) (from Meigs 1851, frontispiece).

reveries."[5] In our time, Stephen Jay Gould (1996, 82–101) found more poetry than science infusing Morton's craniology; he reanalyzed the measures and methods, judging them tainted by prejudicial assumption and poor technique. Then again, these very charges have recently been redirected at Gould himself.

Morton was born at Philadelphia in 1799 of Irish descent and Quaker upbringing. While taking private lessons in medicine, he attended lectures in anatomy and physiology at the University of Pennsylvania, from which he received an MD in spring of 1820. He undertook further medical training at Edinburgh beginning later that year, arriving in the city a few years before the young Charles Darwin began his own medical studies (1825). The next year he went on to Paris, lingering long enough to let slip away his Quaker observance and to suffer the enticements

of the bright, flickering lights. He made his way to northern Italy and then in fall 1822 back to Edinburgh, fulfilling the requirements for a diploma in medicine in August 1823. He returned to Philadelphia in June 1824, where he punctuated a desultory medical practice with the stimulus of research, initially in pathology. He also quickened a recumbent interest in geology, paleontology, and comparative anatomy, all of which he had pursued as a member of the Philadelphia Academy of Natural Sciences, initially becoming a member just after receiving his MD. He worked his way up the administrative ladder of the Academy, eventually becoming its president in 1849. He was appointed professor of anatomy in 1839 at the Pennsylvania College of Medicine, the same year he saw published his extraordinary quantitative study of American Indian skulls, his *Crania Americana* (Figure 9.5).[6]

For *Crania Americana*, Morton not only measured the skulls taken from various Indian tribes but also compared them with skulls of other races, those groups discriminated by Blumenbach. The study also included considerable ethnographic materials culled from reports of travelers, missionaries, and naturalists. Morton's fame rests principally on this book, replete as it is with precise measurements of some 253 skulls and dramatic lithographs of those immortal parts. He supplemented this study with two other compendia of skull measurements, his *Crania Aegyptiaca* (1844), for which he measured the skulls of Egyptian mummies, and his *Catalogue of Skulls of Man and the Inferior Animals* (1849), which corrected some errors of the *Crania Americana* and both expanded the number of human skulls and added those of animals for comparison.

In *Crania Americana*, Morton and his assistant calibrated the exterior dimensions (longitudinal diameter, parietal diameter, facial angle, etc.) and internal cranial capacity of adult skulls from the several races, represented by: 144 North and South American Indians, fifty-two Caucasians (Germans, Celts, Semites, South Asians), ten Mongolians (Turks, Chinese, and Tartars), eighteen Malays (Indonesians and Polynesians), and twenty-nine Ethiopians (Africans). He further

RACES.	No. of skulls.	Mean internal capacity in cubic inches.	Largest in the series.	Smallest in the series.
Caucasian.	52	87.	109.	75.
Mongolian.	10	83.	93.	69.
Malay.	18	81.	89.	64.
American.	147	80.	100.	60.
Ethiopian.	29	78.	94.	65.

Figure 9.5 Morton's summary table of cranial capacities for the five races, with the numbers of individuals, the average capacity of the skulls, the largest capacity of an individual, and the smallest (from Morton's *Crania Americana* 1839).

divided the five races into component "families," some twenty-two different families in all. Prefacing the report on the actual measurements, Morton provided extensive anthropological descriptions of the races and their constituent families, descriptions collected from travel literature and popular assumption. To measure the skulls, Morton and his assistant used white pepper seed (having a hard and uniform consistency) to fill the cranial cavities of the skulls, and then poured the resulting volume of seed into a standard measuring tube to gauge comparative cranial capacities in cubic inches. In the later study of 1849, he used lead shot, size BB, instead of seeds, to obtain more reliable measures; and he expanded the number of skulls to 623. The measures in the 1839 study yielded a hierarchy of mean cranial volumes: the Caucasians showing the highest capacity, followed by Mongolians (Asians), Malays, Americans, and Ethiopians (see Figure 9.5 ~~Table 9.1~~). The 1849 reevaluation emended the hierarchy, making the African group penultimate and the American group last. These measures, in Morton's estimation, provided scientific evidence confirming the large number of ethnographic reports he amassed, reports, however, that were often no more than casual observations of travelers. He epitomized his analysis of the races this way: Caucasians have attained "the highest intellectual endowments"; the Mongolians are "ingenious, imitative, and highly susceptible of cultivation"; the Malay are "ingenious, and [possess] all the habits of a migratory, predaceous, and maritime people"; the Americans are "averse to cultivation, and slow in acquiring knowledge, restless, revengeful, and fond of war, and wholly destitute of maritime adventure"; and the Ethiopian are "joyous, flexible, and indolent," showing diverse intellectual character, of which the "extreme is the lowest grade of humanity" (Morton 1839, 5–7). These descriptions exemplify not so much careful conclusions based on extensive observation as on inertial traditions of description, similar to those easy Hippocratic epitomes made by Linnaeus. Such descriptions usually failed to account for differences in education, a factor Blumenbach made diagnostic of human potential (see ahead).

In *Crania Americana*, Morton attempted to answer a perplexing question of the time: are the members of the various Indian nations of one species with several races or do they constitute several different species altogether? He decided that the Native Americans formed one species with two great families, the Toltecans (the "demi-civilizations" of Peru and Mexico) and the "Barbarous Tribes" of North America, Brazil, Patagonia, and the tip of South America. This initial question and its answer make sense, however, only if you are of a disposition to regard the various human groups worldwide as specifically different from each other. And Morton was of that disposition, though cautious. He had provisionally adopted Blumenbach's division of the races, but never explicitly affirmed that all of the races constituted different species. He did conclude, however, that the Americans were specifically different from the other races. Morton, nonetheless, treated Blumenbach's groups as if they were separate species, even suggesting that their component subgroups – which he called families – had species-like sets of innate features. Their traits were not shaped by the environment after descent from a primordial couple; rather, as he urged, the Creator must have initially rendered each race fit for its specific environment. The purity of these racial lines

could be sullied only by hybridization. Morton's argument for the independent origins of the human races precipitated a storm of religious objection from biblical literalists, which he weathered dangling from the elastic threads of Episcopalian theology (Meigs 1851, 34–36).[7]

Though many prominent naturalists of the period accepted Buffon's criterion of interbreeding fertility as the marker of species unity, the issue remained in contention. Darwin would later use morphological resemblance as the standard and concluded that the judgment was arbitrary as to whether human beings comprised one species with several varieties or several different species (Darwin 1871, I, 235). Yet in light of the scientific acceptance of Buffon's standard and the theological heat of the issue, Morton recognized he had to justify his conclusion, which he attempted to do by citing several studies of hybrid fertility in crosses of different animal species and by providing evidence that certain human hybrids had diminished fertility (Morton 1847). So, as he judged, distinct species could hybridize, but not well. He gathered evidence for diminished fertility from incidences of "half-caste" offspring between Caucasians and Native Australians, which by his estimate was very low, about 200 mulattos in a native population of 15,000. However, Morton did not contrast this roughly 1.5% rate against any reasonably expected rate – it just seemed small (Morton 1851). The criterion for species designation he adopted was simply that of consistent morphology over long periods of time: "when races can be proved to possess certain primordial distinctions, which have been transmitted unbroken, they should be regarded as true species" (Morton 1847, 263). The ancient and recent American skulls of his collection, he argued, provided examples of such stable transmission over time. Yet Morton would have required a special vision to perceive, say, the ideal Peruvian skull lying beneath the variability in size, the induced malformations, and the asymmetries of disease and injury, all of which were found in his collection (see Figure 9.6). Herein, I believe, lies a significant difference between Morton and Tiedemann: shining through the variability of individual skulls, Morton perceived the type, while Tiedemann saw only individuals.

Morton thought of his *Crania Americana* as a treatise in phrenology, and solicited an essay from his friend George Combe, a follower of Franz Joseph Gall, on the general philosophy of phrenology. When Combe wrote the essay, which was appended to Morton's book, he had only a few of Morton's plates to consult and none of the measurements. Little matter. Basically, only two general features of the doctrine seemed to concern Morton – namely, that internal psychological dispositions were manifest in external physical structure and that intelligence was proportional to skull size. The Peruvian and Incan skulls did make Morton more cautious about the size-to-intelligence relationship, however. He observed that "it would be natural to suppose that a people [the ancient Peruvians] with heads so small and badly formed would occupy the lowest place in the scale of human intelligence" (Morton 1839, 99). He yet recognized that their architectural accomplishments and the other monuments of a great civilization gave evidence of high intellectual achievement. He thought the same story could be told of the Incas, whose mean skull capacity was 73 cubic inches, lower than that of other peoples,

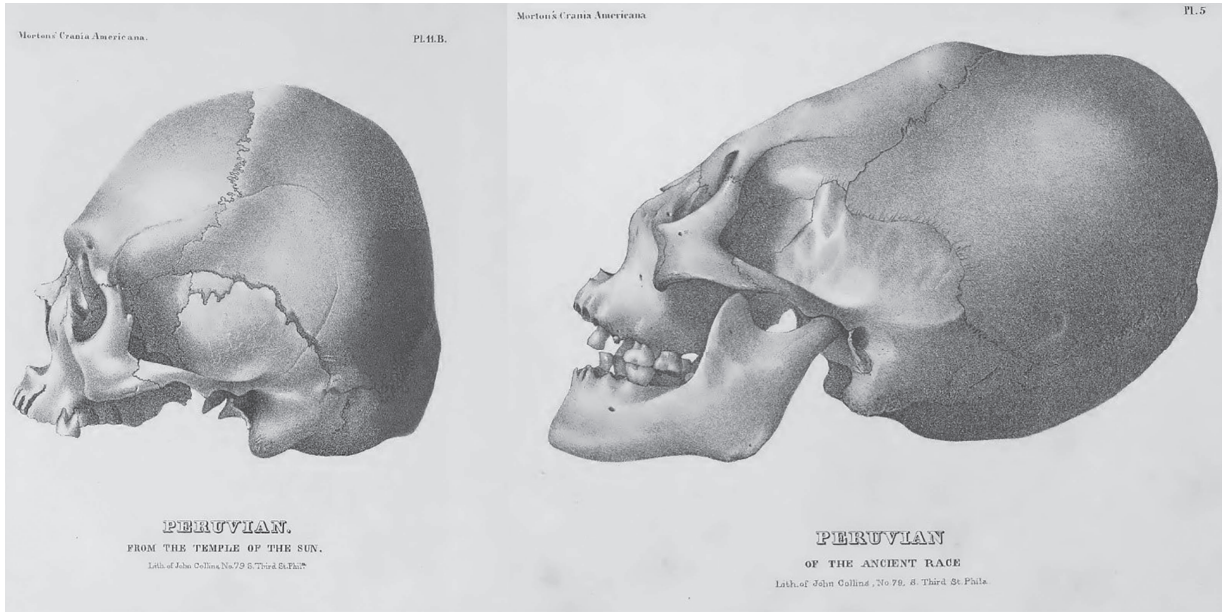

Figure 9.6 Two Peruvian skulls, both likely manipulated and shaped when the individuals were infants (from Morton 1839).

though the remnants of their civilization showed they were superior to most other peoples (Morton 1839, 132). In his review of *Crania Americana*, Combe, writing anonymously, lauded Morton's accomplishment but did take issue with the assumption that the ancient Peruvians had small heads but a great civilization. He rather thought Morton might have been misled by skulls that had been artfully shaped, since an important part of the brain might well have been pushed into an area not properly measured (Combe 1839–1840, 363–64).

Like Tiedemann, Morton did recognize the great variability of skulls. The largest Incan skull in his collection ran to 89.5 cubic inches and the smallest at 60, with an average of 73. The same scope of variability was evidenced throughout his total collection of over 800 human skulls. Moreover, he knew that the skulls of infants could be molded into different shapes, an art performed by many of the American groups (Figure 9.6). But unlike Tiedemann, he seems not to have recognized the basic principle of allometry – the smaller or bigger the skeleton, the smaller or bigger the skull. For the most part, he had only skulls and not complete skeletons, so judgments of body size were precluded as well as adjustments for size differences between males and females. Of course, distinctions of sex, as well as variability of environment and social status – and what these entail – will alter body size tremendously and thus head size.

Morton prided himself on the meticulous care he took with his skull measurements, and in his *Catalogue of Skulls* (1849), he corrected many errors that had made their way into *Crania Americana*. Gould believed Morton's pride was misplaced. In his *Mismeasure of Man* (1981; 1996), Gould reanalyzed Morton's tabulations and discovered what he thought to be unconscious errors that had warped the measures, the calculations, and the conclusions. Morton's figures, Gould asserted, were "a patchwork of fudging and finagling in the clear interest of controlling a priori convictions" (Gould 1996, 86). He discriminated two general kinds of errors – errors of seed measurement and errors of statistical aggregation. Gould assumed that for Caucasian skulls, Morton may have, perhaps unconsciously, packed the seeds into the skulls more tightly, thus giving larger values for cubic capacity – rather unlikely, at least as an error on Morton's part, since his assistant did the measuring. He also argued that Morton simply took the average of the total number of Peruvian and North American skulls, rather than taking averages of the different tribes and then taking the mean of those averages. (Why this latter method was to be preferred is quite unclear. Gould's method assumed that each of the tribes was equally represented in the total Native American population, yet neither Gould nor Morton knew what proportion of the whole populations each of the tribes represented.) Gould then corrected Morton's figures and determined that the five human races differed little from one another in average cranial capacity. Morton himself recognized the measurement errors in *Crania Americana*, which is why he started using lead shot instead of seeds when he later remeasured skulls in his 1849 study. He also thought he had left too much of the actual work of measurement to a careless assistant, whom he subsequently fired. For the new study of 1849, he did all of the measurements himself and added a much larger sampling of skulls. For instance, he doubled the

size of Negro group, bringing the number of their skulls to fifty-eight, and then filled the skulls with lead shot. The new measures elevated the estimate of Negro cranial capacity markedly, from 78 cubic inches to 83 cubic inches for the highest subgroups. Not exactly what one would suspect from a racist finagler, even if this final measure of the highest Negro subgroup stayed below the Caucasian average of 92 for the highest subgroup.[8]

Very quickly after the publication of Morton's 1849 study, Sir William Hamilton, polymathic naturalist and philosopher, vehemently rebutted Morton's conclusions concerning racial differences in skull sizes. He observed that Morton did not (and could not) distinguish male from female skulls: "Now, as the female encephalos is, on an average, some four ounces troy less than the male, it is impossible to compare national skulls with national skulls, in respect of their capacity." (Nor, one might add, could Morton distinguish adolescent from adult skulls.) Hamilton himself, in 1831, had measured skull capacity using sand, and determined that "the Negro encephalos is not less than the European, and greatly larger than the Hindoo, the Ceylonese, and sundry other Asiatic brains." He specifically mentioned that he agreed with Tiedemann's conclusion concerning the Negro brain (Hamilton 1850, 330 and 332).

Tiedemann, Morton, and Gould could not provide perfect measures of imperfect objects. They could not control the multitude of factors affecting biological specimens of uncertain provenance. Each trusted in numbers, which the scientific ethos requires. They were less cautious, however, about which numbers to trust. Both Tiedemann and Morton passed their gaze over hundreds of skulls, which varied greatly in size and shape. Morton detected types within the mass of individuals; Tiedemann saw in the proclaimed types only the individuals. These problems of critical judgment and scientific discernment stand highlighted when the standard becomes not quantitative measures of skulls but aesthetic measures of their beauty.

The aesthetic evaluation of skulls

Blumenbach's Georgian female

Johann Friedrich Blumenbach (Figure 9.7) was the most influential and widely read naturalist at the turn of the nineteenth century. His dissertation, *De generis humani varietate nativa*, was published in 1775 (reprinted in 1776), the year he received his medical degree. The book went through two further editions (1781b, 1795) and many translations, into English, French, Dutch, and German. The same is the case for his many other publications. His interlocutors included Kant, Humboldt, Herder, and Goethe, in addition to numerous anatomists and physiologists of the period. His classification of the races became standard, used by those friendly to his persuasion that race was fluid and a matter of environmental conditions (e.g., Tiedemann) and those who disputed his view, naturalists who regarded race as fixed and typically impervious to environmental alteration (e.g., Morton). Blumenbach's collection of skulls, numbering some 240 at his death in 1840, was

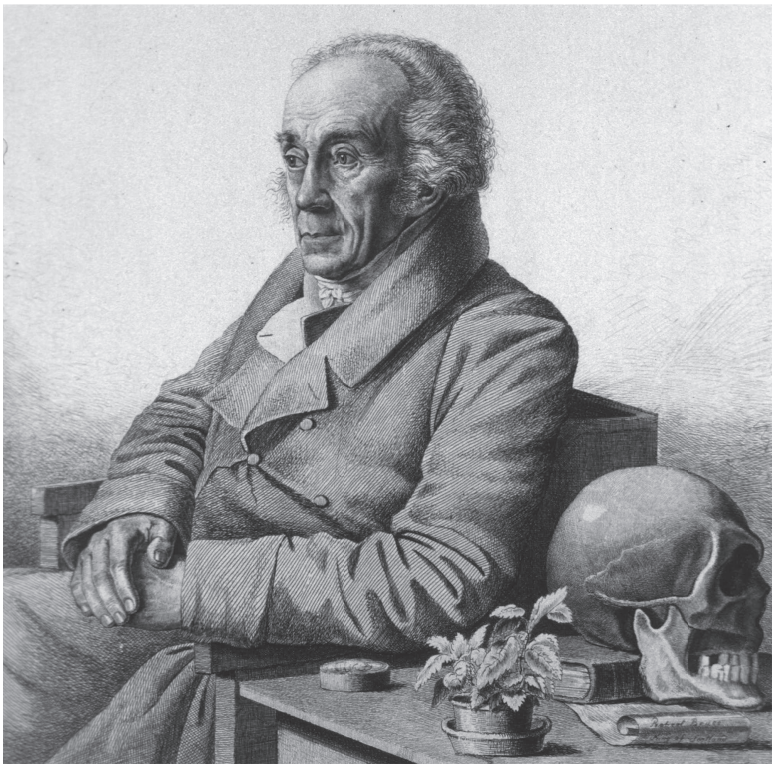

Figure 9.7 Johann Friedrich Blumenbach (1752–1840). Engraving by Ludwig Emil Grimm, 1823.

famed and continued to expand at Göttingen even after he died, the tradition of collecting being continued by colleagues. Those skulls revealed something of a hierarchy, based not on cranial capacity but on beauty.

Blumenbach received his medical degree from Göttingen University in 1775. He was obviously a favored student, for the next year, 1776, he was appointed *extraordinarius* professor of medicine and curator of the university's natural history museum. With the publication of his dissertation, he was recognized immediately as an important scholar, and in 1778 he became *ordinarius* (full professor) in the medical faculty. His real interest, however, was natural history, especially comparative anatomy, with a focus on human beings and their skulls. As his network of correspondents grew, so did his skull collection. He asked these interlocutors, especially those in distant lands, if they would mind sending him a skull or two. He received such gifts from the likes of Humboldt and Goethe, the latter sending a cast of Raphael's skull. Joseph Banks, of the Royal Society of London, provided him skulls from Cook's voyages. Even the Bavarian king Ludwig

I made him the present of an Etruscan skull. His greatest supplier was probably Georg Thomas Ash, military surgeon to the Russian czar and graduate of Göttingen. Ash typically responded with enthusiasm: "No effort will be spared to acquire for you the requested skulls from the Asiatic peoples. It will make me very happy if I succeed in enlarging your excellent collection." Though in a letter the same day to one of Blumenbach's colleagues, Ash confessed that "considerable patience will be required until that request can be fulfilled" (Dougherty and Klatt 2006–2015, II, 312–313).

Blumenbach recognized the great variability of skulls and the way environmental impact could further alter them. For instance, he noted that Germans tended to have block heads, because their mothers had the habit of keeping infants on their backs with their heads usually flat against a firm surface. He was aware, as well, that ancient peoples often manipulated infant skulls, as if they were wet clay, to produce a pleasing shape; and he assumed with the Hippocratics that these alterations could be inherited by subsequent generations (Blumenbach 1795, 214–221). Yet through the varieties of possible alterations, Blumenbach, like other anatomists of race, believed he could still detect racial types, but not in terms of cranial capacity – rather in their aesthetic features. In the third edition of *De generis humani varietate* (1795), he included a spectrum of aesthetically arranged skulls of the five races he had discriminated (this volume, Figure 5.1).

Blumenbach arranged his series of skulls with the central figure that of the Georgian girl, whose skull he thought "exquisitely symmetrical, rather globular, with a forehead moderately expanded, the zygomatic bones a bit narrow but not protruding" (Blumenbach 1795, 206). This "most beautiful cranium" he situated between two extremes: the Mongolian skull, which was "like a block, with zygomatic bones extending prominently," at one end, and the Ethiopian at the other end, with "narrow head compressed laterally, and forehead bumpy [tuberosa] and arched [fornicata]" (Blumenbach 1795, 207–208). Blumenbach confessed that given his experience with the varieties of skulls, he could find no quantitative measure to distinguish the races – certainly not the facial angle devised by Camper. Yet there were fairly constant differences distinguishing the races. He thought this could best be perceived by looking vertically down on the skulls of the Mongolian, Georgian, and Ethiopian (this volume, Figure 5.2).

In Blumenbach's judgment, the Georgian skull was "highly symmetrical and most beautiful [maxime symmetricum et venustissimum], while on either side were skull bones quite opposite and different from it." The skull of the Georgian female had

> the sides of the orbits, as well as the zygomatic bones more elegantly narrowed; they and the mandible itself are concealed under the periphery of the moderately expanded forehead; the former [Ethiopian], by contrast, has the maxillary bones compressed and protruding, and the latter [Mongolian] the zygomatic bones are placed on the same horizontal plane as the small

> bones of the nose and the glabella [bridge of the nose], and they extend enormously and are prominent.
>
> (Blumenbach 1795, 205)

Why did the skull of the Georgian female strike Blumenbach's fancy, and what other values did his aesthetic judgments imply for the five races that he discriminated? Klatt has observed that Blumenbach likened the Georgian skull to the ideal of female beauty in ancient art (Klatt 2008, 90). The elegant symmetry and the cool marble-like whiteness of the female's skull seem to have evoked from Blumenbach such comparisons with classic statuary. He did on occasion mention that his judgment was based on *our* standards of beauty, but at other times he described the beauty of the Georgian female's skull in more absolute terms (Blumenbach 1795, 289). The backstory of a captured young woman and her mysterious death undoubtedly made the aesthetic experience even more piquant (see Rupke's introduction to this volume and the beginning of this essay). Add to that the reputation of the Georgian women for comely beauty (Blumenbach 1795, 303), befitting a race connected by legend to the area where Noah's ship beached after the flood, and Blumenbach's judgment is rendered more comprehensible. As in Dinesen's story, the skull of the Georgian female became the repository for a history of singular personal meaning to the great naturalist. But what did Blumenbach's aesthetic judgments imply for the other races? Strangely, very little.

A year after the publication of the third edition (1795) of his *De generis humani varietate*, Blumenbach began issuing a series of pamphlets with illustrations of natural historical objects (Blumenbach 1796). In the first series, he provided faces of known individuals – copper etched portraits – who were to represent the different races, thus giving flesh to each of the skulls he had described the previous year. Each individual pictured was a member of one of the five races, and each had either been raised in Europe or spent significant time there. The visages were certainly less primitive than those usually depicted by other authors. But Blumenbach also intended, by the brief accompanying biographies, to suggest that the various races had individuals of conspicuous talents who exercised those talents in European pursuits.

The Negro Jacob Johan Eliza Capitein, for instance, had been taken as a child from Ghana, raised by a Dutchman, and given an early education in classical languages and mathematics (Blumenbach 1796, no. 5). He attended the University of Leiden and became a theologian and preacher in the Dutch Reformed Church. His sermons and Latin poetry revealed to Blumenbach the innate capacities of the African race. In another essay, occasioned by a trip to Switzerland in 1787, he mentioned several other cases of Africans living in Europe whose features varied as to skin color and other traits and who demonstrated obvious talents (Blumenbach 1787). He was especially admiring of a young Congolese woman whom he met while visiting a chateau in Yverdun, at the southern end of Lake Neuchâtel. The naturalist's eye immediately fell on "features that had they been in white skin would certainly have been regarded quite agreeable" (Blumenbach 1787, 3). Moreover, she was learned in obstetrics and had become noted in the region for

her abilities in midwifery. Blumenbach insisted that his interactions with a variety of Negros and an investigation of their abilities made him realize that "Negros, in respect of their natural mental capacity and abilities, certainly do not appear inferior to the other human races" (Blumenbach 1787, 4). What the Negroes generally lacked, as did other races, were opportunities of civilized living and education. Hence, in Blumenbach's mind, the great evil of slavery.

Carus and the aesthetics of Schiller's skull

Carl Gustav Carus (Figure 9.8) was a physician, an anatomist, an artist – a friend of the Romantic painter Caspar David Friedrich, with whom he would travel on painting excursions – and a protégé of Goethe, who greatly admired his magnificent treatise on comparative anatomy, *Von den Ur-Theilen des Knochen- und Schalengerüstes* (1828).

As a young physician, Carus helped direct the field hospitals during the Battle of Leipzig (October 16–19, 1813), the bloodiest of the Napoleonic campaigns. After his retreat from Moscow, the emperor recruited a second Grand Army to secure his earlier German acquisitions. The largest and deadliest of his efforts occurred in and around the city of Leipzig. French forces totaled almost a quarter of a million men, and the coalition facing them – composed of German, Austrian, Russian, and Swedish troops – numbered about 350,000. After four days of slaughter, the French fell back into a costly retreat, leaving the battlefields littered with 90,000 casualties from both sides. Carus himself almost died from the typhus that blazed through the forests of wounded. In his autobiography, he reflected on this experience:

> I understood for the first time [. . .] how little a human life seemed to count in the account-books of the world. A rich country was drained of the blood of its young men. Thousands of families must send off what had been cultivated for long years with love and care and full of hope – so that they would be tossed aside without a thought. [. . .] Whole generations were cut down by the merciless angel of destruction and there was no one there who seemed to have noticed. [. . .] Certainly it is not possible to have attained the elevated concept of the wonderful structure of man and of the value of the character of the human spirit and not feel a deep shudder when one – one cannot express it otherwise – becomes aware of the contempt had for humanity in its masses.
>
> (Carus 1865–1866, I, 122–123)

After Napoleon's forces fled Germany, a measure of peace returned to the land, and Carus again took up interests cultivated in medical school – namely, research in anatomy and physiology – ultimately composing during his lifetime some eight or so major monographs and numerous lesser studies. His field of interest expanded to psychology and natural philosophy, the latter reflecting his reading of the works of Schelling and his friendship with Oken. In 1862, his scientific eminence brought him the presidency of the Deutsche Akademie der Naturforscher (Leopoldina), a position he held until his death in 1869. And through his long, rich

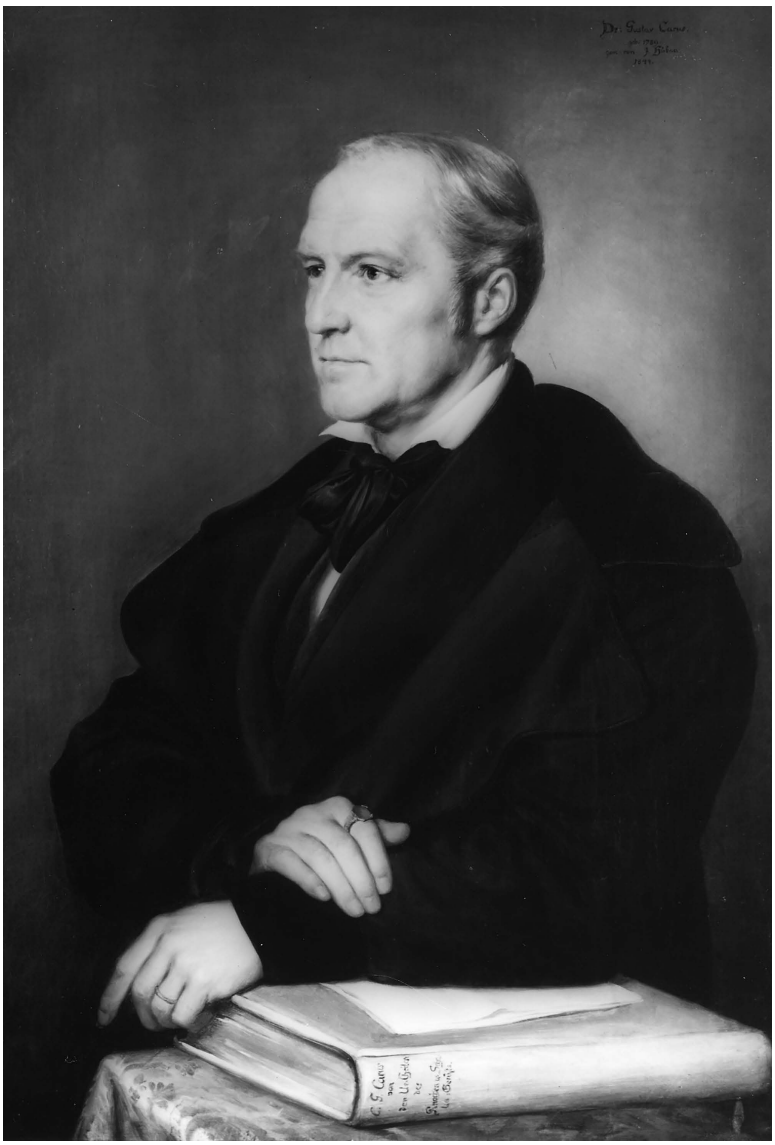

Figure 9.8 Carl Gustav Carus (1789–1869). Oil by Julius Hübner (arm resting on his famous book, *Von den Ur-Theilen des Knochen- und Schalengerüstes*, 1828) (by permission of the Frankfurter Goethe-Museum).

life, he pursued drawing and painting, especially landscapes in a Romantic style. He expressed his artistic talent also in his science, in the anatomical drawings illustrating his numerous monographs. The depictions that crowded the plates of his great work *Von den Ur-Theilen* won the praise of Goethe.

In the decade after the completion of his *Von den Ur-Theilen*, Carus's energies did not flag. He was occupied with travel, considerations of aesthetics – especially Goethe's *Faust* (Carus 1835) – a second edition of his manual of comparative anatomy (Carus 1834), and a comprehensive study of human physiology. This latter effort yielded his *System der Physiologie*, three large volumes (1838–1840) that explore the different animal systems – the vascular, muscle, pulmonary, nerve, skeletal – and that pay considerable attention to the origins of human beings, their races, and their psychic life.

In Volume 3 of the *System der Physiologie*, which he completed in June 1840, Carus had begun a study of skulls that would be expanded the next year into his *Grundzüge einer neuen und wissenschaftlich begründeten Cranioscopie* (Foundation of a new and scientifically grounded cranioscopy; finished on in February 1841). Several events seem to have initially stimulated him to work out a theory of cranioscopy. In 1833, the third edition of Combe's *System of Phrenology*, an explication of Franz Joseph Gall's theory, appeared in a German translation (Combe 1833). Carus specifically mentioned the book in his *System der Physiologie* (Carus 1838–1840, III, 350). He thought the phrenologists had made a good start, but exhibited a distinct lack of significant anatomical and physiological knowledge of the human brain and skull. Then in spring of 1840, Carus obtained four illustrations taken from George Morton's *Crania Americana*, though not the book itself. Initially he was intrigued by the images of Peruvian, Mexican, and Carib Indian skulls that had been distorted by artificial means (Carus 1838–1840, III, 351). A few months later, in August 1840, he read a detailed account of Morton's work in a German medical journal (Anonymous 1840); the long, three-part article included Morton's table comparing average cranial capacities of the different races, measurements Carus would cite in his subsequent work. In passing, the article also mentioned Tiedemann's skull measurements, and criticized his conclusion that the average African skull fell within the range of the average Caucasian skull (Anonymous 1840, 212). The images and the literature pushed Carus a little further along a path he had already begun.

In his System der Physiologie and in his Cranioscopie, Carus developed a theory of skull measurements directly tied to brain formation. He contended that his theory was grounded in the most recent science and that it was far superior to anything suggested by Gall or Combe. He first distinguished three brain areas, which were quite evident in lower animals and in the early human fetus: the hindbrain, or cerebellum; the midbrain, or corpora quadrigemina; and the forebrain, or cerebral hemispheres (Carus 1838–1840, III, 341). Ablation experiments and postmortem pathology examinations indicated the functions of each: the hindbrain governed willful behavior, desires, and sexual impulses; the midbrain gave expression to feeling, especially self-feeling (Gemeingefühl), and, in humans, self-awareness (Gemüth); and the forebrain received perceptions, constructed images, and was the locus of intellect in humans (Figure 9.9, on the left). As one passed from more primitive creatures to more advanced – or from the early stages of the human fetal brain to that of the adult – marked changes in brain morphology could be observed. First, the three brain areas gradually became more tightly bound together through

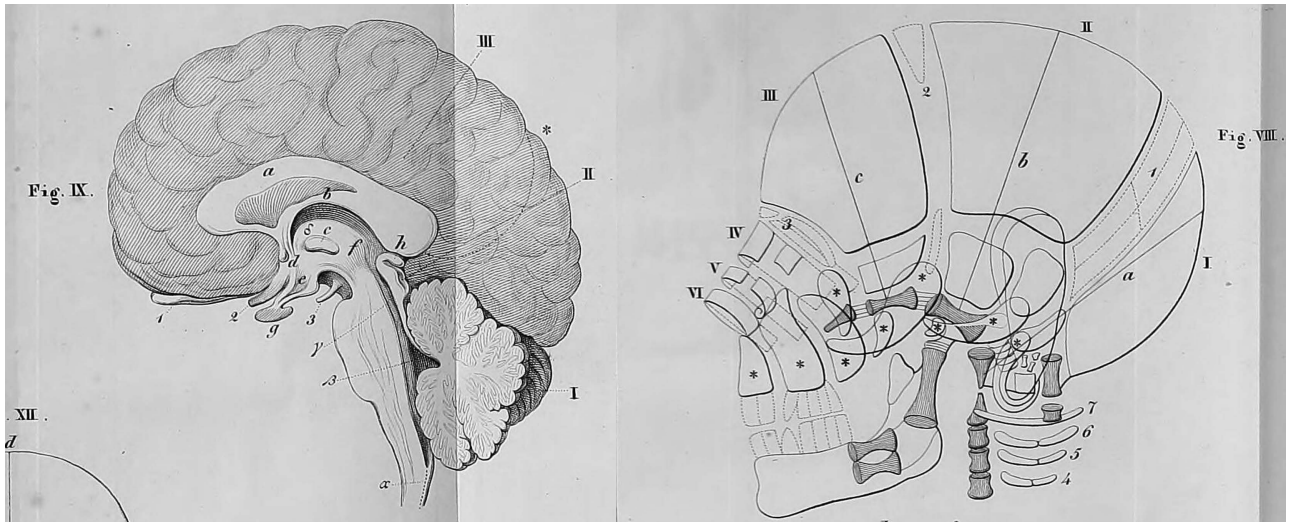

Figure 9.9 On the left, human brain (Fig. IX), with three areas indicated: I, the hindbrain or cerebellum (will, behavior); II, the midbrain or corpora quadrigemina, at the top of the brain stem (feeling); III, forebrain or cerebral hemispheres, which cover the other structures of the adult brain (perception and intellect). On the right (Fig. VIII), the human skull with the three principal plates labeled I, II, III (from Carus 1841).

a multitude of nerve connections, such that functions initially characteristic of one area would be distributed throughout the whole brain; and second, the cerebral hemispheres, in the human adult, had grown to cover the midbrain and most of the hindbrain (Figure 9.9, on the left).

Shielding these three brain areas were the three plates of the skull, those transformed vertebrae whose development through lower species to higher Carus had traced in his *Von den Ur-Theilen* (Figure 9.9, on the right). He maintained that the dimensions of those three plates – their length, breadth, and height – might be diagnostic of racial capacities and individual abilities. Here then was the basis for a truly scientific cranioscopy – or so Carus argued. Yet, if that were the main thrust of Carus's science, it would seem no better than that of Gall, perhaps even less refined – for in the adult human, for example, if the cerebral hemispheres covered most of the other two areas, how could the mid-skull plate and the hind-skull plate be indicative of any features of those parts of the brain they no longer covered? Moreover, why would one suspect in the first place that those three transformed vertebral skull plates could tell you anything about the brain underlying them and be diagnostic of psychological abilities? None of this would make any sense in the absence of the Romantic metaphysics that does provide answers to these questions. We may no longer be receptive to Carus's particular metaphysical views, but they were not foreign to his place and time.

Carus's metaphysical assumptions derived ultimately from Spinoza, but more proximately from Goethe and Schelling (Carus 1865–1866, III, 134–135). The one substance in existence was *Deus sive Natura* – the divine spirit and nature were two expressions of that underlying substance. Organisms embodied this dual character and more fully expressed it over time, so that all of nature moved from more primitive stages to more developed stages. The human individual as well as the human species underwent continuous development. The individual moved, both bodily and psychologically, through stages of fetal life, childhood, and adulthood. The person's inner life began at the unconscious, barely feeling stages of embryogenesis, moved through the childhood stages of the dawning of consciousness, and finally achieved the mature stage of rational life. The human species itself went through comparable developmental periods, from the misty obscurity of prehuman life, through the more primitive races of mankind, to the more advanced races, and finally to the most elevated individuals, those geniuses who came closest to realizing the ideal of humanity (more of this ahead). Like Schelling, Carus held that the abstract idea of humanity inclusively contained the ideas of the various levels of organic development; and like Goethe, he understood this idea to be creative, yielding over time the various physical manifestations of organisms, from simplest up through the races of man (Carus 1838–1840, I, 349). In a given individual, development of the body would be mirrored by the development of that divine idea of humanity, now in its particular instantiation as the human soul. At the very beginning of life, the fetal brain, its nascent skull covering, and its concomitant psychic idea (the soul) were, in Carus's theory, bound to one another, such that the skull plates would be impressed with that original binding.[9] So, for example, even though in the adult, the midbrain lay

below the cerebral hemispheres, the mid-skull plate would still reflect the mental dispositions with which it originally corresponded at the beginning of fetal life; the psychic energies of the various brain areas (*die Energie des Hirns*) would thus manifest themselves in the dimensions of the skull plates of the adult (Carus 1838–1840, III, 342). Carus's idealist metaphysics would be shared by the likes of Goethe, Johann Gottlieb Fichte, Schelling, and Hegel, but certainly these individuals did not set that metaphysics to do the kind of intricate physiological work that supported Carus's cranioscopy. His developmental theory of race would also rest on idealist metaphysical assumptions.

In his *System der Physiologie* and later in his *Denkschrift zum hundertjährigen Geburtsfeste Goethe's* (Memorial for Goethe's hundredth birthday, 1849), Carus distinguished four races of the one human species (Carus 1838–1840, I, 122–123): men of the day (Caucasian-Europeans), men of the night (Ethiopians), men of the eastern twilight (Mongolian-Mylan-Hindus), and men of the western twilight (Americans). He assumed the original Caucasian race appeared after the age of the great lizards, and, with Blumenbach, suggested that the original group first appeared on the high Asian plateau, around Mount Ararat. Ultimately whether humans arose from a more primitive form was, Carus admitted, lost in "a mysterious darkness" (Carus 1838–1840, I, 113). He yet thought several propositions could be established with certainty: (1) that the development (*Entwicklung*) of humanity was essentially and necessarily spiritual (*geistig*); (2) that the development had occurred through the social action of individuals manifesting different attributes (especially the duality of the sexes); (3) that its highest expression was in particular individuals (e.g., Goethe); and (4) that this development had occurred in different regions of the earth in different ways (Carus 1838–1840, I, 113–117). Like Blumenbach, Carus assumed the original Caucasian group spread to different parts of the world and adapted to different regions. Citing Herder's essay on language, Carus maintained that crucial to the development of humankind were the advent of language and the interactions of individuals within a society. The different races represented a progressive scale, with the people of the night at the lowest rank, then the people of the western twilight, then those of the eastern, and finally with the most developed being the people of the day. In this developmental scheme, the people of the night were still at the fetal stage, though with progressive potential, while people of the day exhibited the most advanced form of humanity (Carus 1838–1840, I, 114–115). Carus's developmentalism came very close to an authentic biological evolutionism, yet at the end of his life, when he was fully apprised of Darwin's theory, he would not take the final step.[10]

Carus justified his classification of the races through the kinds of measurements his cranioscopy suggested, though later he would seek additional support from Morton's measurements (Carus 1849, 19). These measurements also permitted him to determine the cognitive gifts of particular individuals, such as Kant, Napoleon, and Schiller (Figure 9.10). The empirical sampling of skulls on which his measurements were based and from which conclusions were drawn was minimal, however. In the *Cranioscopie*, Carus recorded measurements of a motley

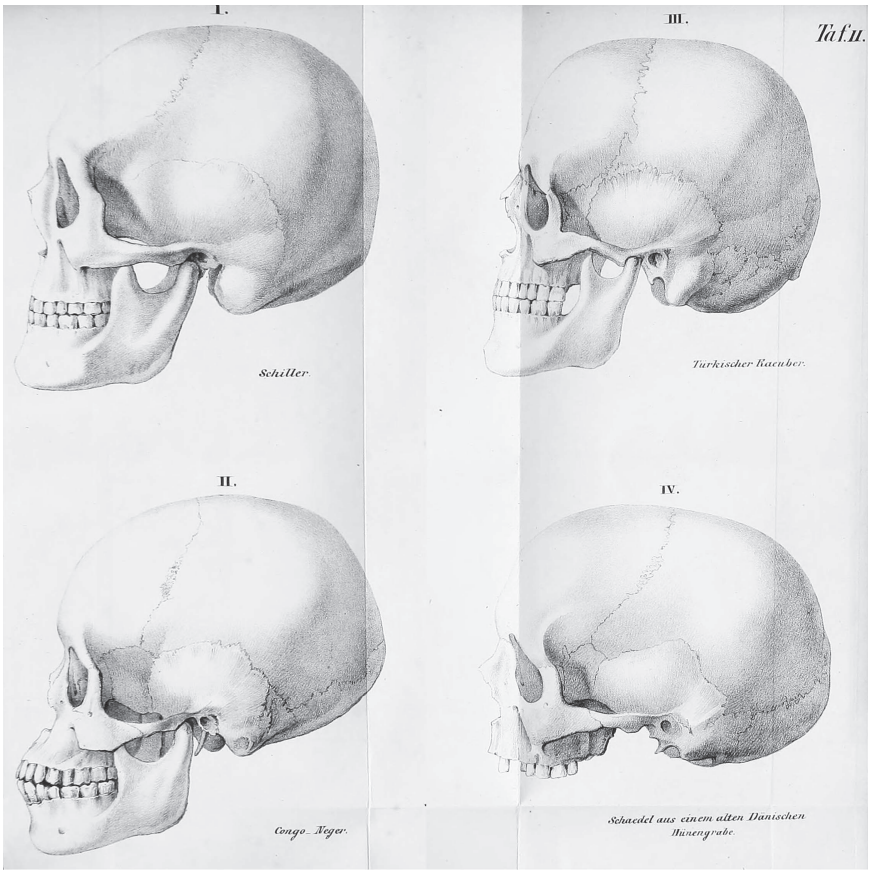

Figure 9.10 Schiller's skull (I), compared with the skulls of a Congo Negro (II), a Turkish thief (III), and a Dane, taken from an old grave (IV) (from Carus 1841).

of seventeen skulls, some of which were not even the original skulls but plaster casts (e.g., Napoleon, Charles-Maurice de Talleyrand, and Schiller), and others still harbored a living soul (e.g., Ludwig Tieck and Carus himself). The measures were done with calipers, which could give the length, width, and height (this last from the ear-opening to the highest part of the plate). Here is a sampling of the measures (Table 9.1).

What do these measures purportedly mean? Carus reckoned that the low measures for the frontal plate of the Negro slave meant a low intelligence; his mid-plate likewise showed deficient sensitivity and self-reflection. The hind-plate, though, indicated a strong will and sexual impulses – even having a greater height than Schiller's. Napoleon's measures revealed an extremely strong intelligence, great sensitivity, and an iron will. Schiller's skull, in contrast to the others, showed

Table 9.1 Table of skull measurements (extract from Carus 1841). The measures are given in inches and twelfths of an inch. Napoleon's death mask was missing the rear portion, hence the absence of scores. Carus probably could not accurately measure the length of his own skull plates, not knowing where the mid-plate and hind-plates began and ended – hence the blanks for lengths of the various plates.

	Schiller	*Negro slave*	*Napoleon*	*Carus*
Frontal plate				
Height	5"	4"6"'	5"8"'	5"
Width	4"8"'	3"10"'	5"5"'	4"9"'
Length	4"8"'	4"2"'		
Mid-plate				
Height	5"4"'	4"7"'	5"11"'	5"7"'
Width	5"10"'	4"6"'	5"8"'	5"8"'
Length	4"8"'	4"2"'		
Hind-plate				
Height	3"7"'	4"	4"2"'	
Width	4"	3"2"'	4"1"'	
Length	3"7"'	3"5"'		

that "the regions of intelligence, feeling, will, and desire are quite harmoniously developed [*sehr harmonisch entwickelt*]. The first two regions are significant and the relationships are quite felicitous throughout" (Carus 1844, 48). What is it that makes a poet's skull? For Carus, a head, developed generally in "beautifully harmonious structures [*schönen harmonischen Formen*], with a well-formed front head, a modest rear head, but a decidedly powerful middle head – these features indicate a poetic human being" (Carus 1841, 57). None of the other skulls that Carus examined exhibited the graceful harmony of Schiller's, not Napoleon's and not Kant's. The more a skull would deviate by reason of a one-sided development in either height, breadth, or length of the skull plates, "the more generally the form would represent a lower, unbeautiful [*unschöne*] and, in its psychic significance, an unfavorable form" (Carus 1841, 59). In all of Carus's six works devoted to cranioscopy, Schiller's skull served as the standard by which to evaluate all of the other skulls, just as the Georgian girl became the aesthetic standard for Blumenbach.

Carus based his cranioscopy on exacting anatomical descriptions and on powerful generalizations from that anatomical work. These latter contributions entered the mainstream of biology during the mid-part of the nineteenth century, especially through Richard Owen's conception of homology. Carus's developmentalism stopped just short of a full-blown evolutionary conception, and represents a stage in German scientific life that prepared the way for a rapid acceptance of Darwinism. Carus's empirical measures of skulls won the admiration of many for their precision, but the effort to derive portraits of intelligence and talent from such measurements seems to us little better than the efforts of the phrenologists – perhaps even less availing, since Carus's interpretations of skull plates had to be justified by a metaphysics in overdrive.

Note on Schiller's skull

Carus presented Schiller's skull as a singular standard for the harmonious development of poetic sensibility. There are two problems with his choice. First, as mentioned, he didn't measure Schiller's skull directly, but rather a plaster cast of the skull. But the second difficulty completely undermines his effort. There is strong evidence that the skull thought to be Schiller's is not really his. At his death in 1805, Schiller was buried in a mass grave for distinguished individuals in Weimar. Twenty-one years later, Karl Schwabe, the Weimar Bügermeister, decided to retrieve Schiller's remains, which by then had become mixed with the bones of many others. He pulled out twenty-three skulls and judged the largest "must be Schiller's skull" (Schöne 2002, 14). Goethe revered this skull, making it into a small shrine to his friend. It was this skull that provided the plaster cast that Carus used for his measurements (Carus 1845, Tafel 1). In later years, doubts arose concerning the skull, and another skull was recognized as more likely Schiller's. In 2008, DNA from both skulls was extracted and compared with DNA from the remains of known relatives of Schiller. Neither skull was a match (Smee 2008).

Conclusion: Exacting measurement and ineffable beauty of skulls

Global travel during the late eighteenth through the mid-nineteenth centuries revealed the great variety of mankind and brought to the fore the question of the very nature of the human. During this same period, slavery as a political and moral question grew in volatility and nearly destroyed a young nation. Science, especially the introduction of exact measurement into new areas of inquiry – into anatomy, psychology, and anthropology – should have been able to provide, or so it was thought, objective methods for coming to conclusions about such social issues. Techniques of measurement thus came to be applied to that most durable and iconic feature of the human – namely, the human skull.

Four scientists of acknowledged ability undertook the measurement of man, or at least his skull – Tiedemann, Morton, Blumenbach, and Carus. All four assumed that external physical characteristics might reveal internal mental traits and talents or affiliation to an ethnic group. Each, however, brought to his effort different assumptions and different techniques of measurement. The former two focused on quantitative determinations of cranial capacity – indicative of mental ability – and the latter two were concerned with aesthetic evaluations, which might suggest innate talents or racial origins.

All four of the naturalists recognized that there was significant variability both across races and within races. Tiedemann and Blumenbach, the former measuring cranial capacity and the latter aesthetic features, found no significant differences in innate qualities of the races, while Morton and Carus thought the races formed a hierarchy ranging from inferior to superior. Tiedemann recognized that women had smaller skulls than men, but actually larger skulls relative to body size; Carus

judged the anterior and posterior plates smaller in women, which implied smaller intelligence and weaker will, though a mid-plate that was relatively larger, suggestive of greater sensitivity. Despite the variability found within and across races, Morton and Carus detected beneath such differences stable and unchanging types, while Tiedemann and Blumenbach seemed to perceive only individuals.

From our perspective, Morton and Carus appear simply to have endorsed cultural stereotypes, yet we should not demand them to be wiser than their times would allow. One likely explanation for their assumption that general types lay beneath variable structures was their training. Both were illustrators, and Carus, of course, an extremely accomplished artist. As Ernst Hans Gombrich has shown, from the late medieval period through the first half of the nineteenth century (and even today), drawing manuals instructed the novice to practice schemata – that is, patterns for drawing *the* bird, *the* tree, *the* human figure, as opposed to drawing a particular bird, a particular tree, a particular human being. As the student advanced, he or she could begin adding individual details to the schematic drawing, turning the universal into the particular (Gombrich 1984, 146–178). So the artist and illustrator, at least as part of their training, would have reflexively perceived the schema – or as Carus called it, the archetype – beneath the particularity. Blumenbach and likely Tiedemann may have been more disposed to see only individuals instead of types because they had personal acquaintance with Negros, and so stereotyping would be more difficult than it would be in the absence of such interaction. Of course, personal acquaintance is not an infallible protection against prejudice, as slaveholders in the American South make evident. This array of social causes and professional inclinations does seem to explain differences existing among the four naturalists, but, of course, something must be attributed to individual disposition and personal psychology.

In this essay, I have paid special attention to the aesthetic judgment of skulls, since such evaluation seems not only unusual but also subjective, not a scientific measure. Both Blumenbach and Carus were readers – and followers – of Kant, who argued, in the third *Critique*, that the judgment of beauty made a universal claim on others. It was subjective, according to Kant, but nonetheless universal since judgments of beauty depended on an aesthetic feeling arising from an ineffable relationship between reason and imagination, traits common to all humans. Since the judgment of beauty was grounded in a feeling that lacked a conscious, rational component, Blumenbach and Carus, as Kantians, could do hardly better than point to the object, while uttering terms like "symmetry," "harmony," and "graceful arrangement of parts," which were little more than synonyms for "beauty." For the Kantian, direct experience was crucial, not argument, in making a judgment of beauty.

At the end of the nineteenth century and through the early part of the twentieth, intelligence tests began to be constructed and personality tests devised. These had the potential for revealing inner human traits more directly than evaluations based on external measurements. External, physical features were still used, but

the Nazi experience quashed most such efforts. So the period discussed in this essay represents a particular moment in the evaluation of human beings. Aesthetic evaluation of skulls is even more distant from our present expectations. But I have seen the Georgian female's skull in the Blumenbach collection at the Georg-August-Universität in Göttingen. It is quite beautiful.

Notes

1 I am grateful to Marina Bell for putting me on to Dinesen's short story.
2 Lorenz Oken advanced the hypothesis of recapitulation in an early work. See Oken (1805, 164–167). I discuss the hypothesis in Richards (2002, 493–494).
3 Tiedemann (1808–1814, I, 64–65): "Just as each individual begins with the simplest formation and during its metamorphosis becomes more evolved [*entwickelt*] and developed, so the entire animal organism [i.e., animal kingdom] seems to have begun its evolution [*Entwicklung*] with the simplest animal forms that is with the animals of the lowest classes." While studying in Paris with Cuvier, Tiedemann would have become quite familiar with Lamarck's version of evolution. See also Tiedemann (1830, I, 102–104). I have discussed Tiedemann's theory of recapitulation and that of many others, including Darwin, in Richards (1992).
4 Stephen Jay Gould wrote an admiring essay on Tiedemann (Gould 1999). Gould said that Tiedemann "offered no summary statistics for groups – no ranges, no averages"; this gave Gould something to do – he provided the averages. Gould, however, relied on the English version of Tiedemann's study; in the German version, as in Figure 9.3, Tiedemann certainly did give summary statistics and ranges, if not averages. Gould thus missed the last set of summary tabulations showing the greater proportion of large skulls for the Caucasian and Malay races. By depending only on the English version Gould was led to speculate: "Did Tiedemann calculate these means and not publish them because he sensed the confusion that would then be generated – a procedure that I would have to label as indefensible, however understandable? Or did he never calculate them because he got what he wanted from the more obvious data on ranges and then never proceeded further – the more usual situation of failure to recognize potential interpretations as a consequence of unconscious bias? I rather suspect the second scenario" (Gould 1999, 69). Gould simply missed Tiedemann's obvious worry about his numbers.
5 Charles Meigs, a long-time friend and colleague of Morton, included Humboldt's letter as an appendix to Meigs (1851). See also Kelly (1912, II, 192–197) and Stanton (1960, 24–44). Fabian (2010) gives a detailed account of Morton's efforts to collect skulls from friends, traders, travelers, and grave-robbers.
6 Morton's *Crania Americana* was simultaneously published in London. The price of $20 was prohibitively expensive and Morton had to use an inheritance to cover his costs in production and printing. As a result of lack of sales, he sent complimentary copies to many individuals and learned societies in America and Europe (Fabian 2010, 87–91).
7 The unity of mankind was not only a theological issue; it also engaged naturalists on either side of the divide between monogenists and polygenists. James Cowl Prichard led the partisans of human unity and Louis Agassiz represented those who believed humans to consist of several distinct species. Agassiz strongly supported Morton in the fray (Lurie 1954).
8 In his *Catalogue of Skulls* (1849), Morton provided the averages of the families within the five races. So the Negro race, in his tables, comprised four families: Native African, American-born Negros, Hottentot, and Australian. The first two had the highest cranial capacities of 83 and 82 respectively. The Caucasian race had eight families, with the Teutonic family having an average of 92. Jason Lewis and colleagues at Stanford remeasured a sampling of Morton's skulls and found his final measures using lead shot

to be decently accurate. They rejected Gould's claims about the Morton's analyses of group means and subgroup means. See Lewis et al. (2011) for the particulars. Weisberg and Paul (2016) have entered the fray, and support Gould's conclusions. They point out that Gould did not dispute the accuracy of Morton's shot calculations; they focus on the fact that Morton's errors in the seed measurement were pronounced in regard to the African skulls. They contend if Morton's errors were not due to unconscious bias, the errors should have been systematically the same. Since they were not systematically the same, "Gould's claim that this is prima facia evidence of unconscious bias in Crania Americana remains intact" (Weisberg and Paul 2016, 3). This does not follow at all. Morton's racial attitudes are clear from his anthropological discussions. But if he were unconsciously manipulating the seed calculations to meet those prejudices, why did he fire his assistant and redo all the calculations with more reliable lead shot? After all, his prejudices would have been satisfied with the original seed calculations. There are many other possible reasons for the non-systematic errors in the seed calculations than unconscious prejudice. First, it was Morton's assistant, not Morton, who did the actual measurements. Second, if the assistant were making careless errors, there is no reason to assume he would be carelessly systematic.

9 Carus (1841, 8 fn 1): "At the first disposition [Anlage] of the brain, the first, second, and third brain areas and the first, second, and third skull plates completely correspond, so that with the progressive formation of the brain, that is, the greater development of the forebrain area, [. . .] the original relationship of the skull plates in relation to the three brain areas remains the same."

10 Carus published several essays showing not only differences in morphology between man and gorilla but also differences in spirit, such that "man is raised to something qualitatively other than the animal" (Carus 1863a, 30). See also Carus (1863b; 1865).

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