

# Using facial angle to prove evolution and the human race hierarchy

Jerry Bergman

A measurement technique called facial angle has a history of being used to rank the position of animals and humans on the evolutionary hierarchy. The technique was exploited for several decades in order to prove evolution and justify racism. Extensive research on the correlation of brain shapes with mental traits and also the falsification of the whole field of phrenology, an area to which the facial angle theory was strongly linked, caused the theory's demise.

The use of the facial angle, a method of measuring the forehead-to-jaw relationship, has a long history and was often used to make judgments of inferiority and superiority of certain human races. University of Chicago zoology professor Ransom Dexter wrote that the “subject of the facial angle has occupied the attention of philosophers from earliest antiquity.”<sup>1</sup> Aristotle used it to help determine a person's intelligence and to rank humans from inferior to superior.<sup>2</sup> It was first used in modern times to compare human races by Petrus Camper (1722–1789), and it became widely popular until disproved in the early 20<sup>th</sup> century.<sup>2</sup>

The theory proposes that animal evolutionary history involves a progression from a nearly horizontal facial angle to a vertical one, a transition that was also used to support the evolution of ape-like creatures to humans. Facial angle was also commonly used in classifying other animals from primitive to highly evolved life-forms.<sup>3</sup> Proponents of the facial angle theory hypothesized that facial angle was not only a trend from fish to humans, but could also be used to *rank* human groups from inferior to superior.<sup>4</sup> It was a “primary instrument of scientific racism.”<sup>5</sup>

Facial angle “scientific” evidence was widely used by racists such as Arthur de Gobineau to justify racism on what they thought were scientific grounds.<sup>6</sup> Influenced by the now discredited pseudoscience of phrenology, the “science” of determining mental traits by evaluating various skull traits such as bumps and valleys, Lawrence wrote that the ancients believed

“... that an elevated facial line, produced by a great development of the instrument of knowledge and reflection, and a corresponding contraction of the mouth, jaws, tongue, nose, indicated a noble and generous nature. Hence they have extended the facial angle to 90° in the representation of legislators, sages, poets, and others, on whom they wished to bestow the most august character. In the statues of their heroes and gods they have still further exaggerated the human, and reduced the animal characteristics; extending the forehead over the face, so as to push the facial line beyond the perpendicular, and to make the angle 100°.”<sup>7</sup>

Thus facial angle science quantified not only the “very striking difference between man and all other animals”,

but also the difference between the human “races”.<sup>8</sup> Science historian John Haller concluded that the “facial angle was the most extensively elaborated and artlessly abused criteria for racial somatology.”<sup>2</sup>

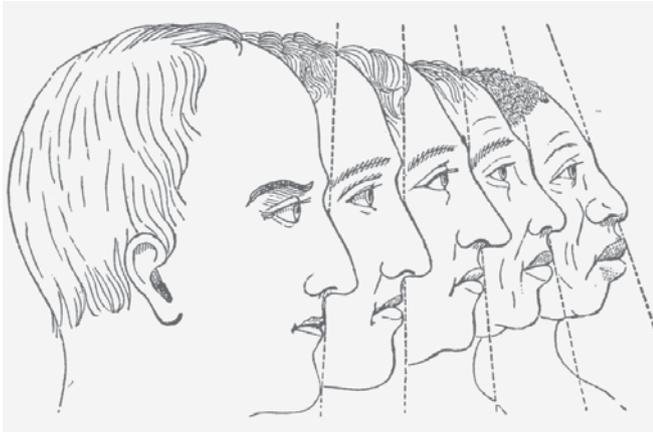
Supporters of this theory cited as proof convincing, but very distorted, drawings of an obvious black African or Australian Aborigine as being the lowest type of human and a Caucasian as the highest racial type. The slanting African forehead shown in the pictures indicates a smaller frontal cortex, such as is typical of an ape, demonstrating to naïve observers their inferiority. This observation was important because the frontal cortex is the location of higher mental faculties, such as reasoning ability. It was thus assumed that it became larger as humans evolved, changing the facial angle.<sup>9</sup>

## A history of the theory

The first angular measurement system devised for the comparative study of human crania was devised by the renowned Dutch anatomy professor Petrus Camper in his 1792 *Dissertation on the Natural Varieties Which Characterize the Human Physiognomy*.<sup>10,11</sup> His system exerted such a profound influence on the development of the physical anthropology field that he is often called “the grandfather of scientific racism”.<sup>12</sup> One study Camper completed involved comparing the heads modelled by the ancient Greek sculptors with those drawn by Dutch and Flemish artists.<sup>13</sup>

An observation he made from this study was to note that, judging by the sculptures, which are now known to be inaccurate, the face profile of the heads of famous Greek men was much steeper than that of Dutch and Flemish heads. He then extended the comparison to animals and discovered that the jaw structure was important in determining the head and face angle. Camper concluded that, by comparing “heads of the Negro and the Calmuck to those of the European and the ape”, a line could be

“... drawn from the forehead to the upper lip that indicates a difference in the physiognomy of these peoples and makes apparent a marked analogy between the head of the Negro and that of the ape. After having traced the outline of several of



**Figure 1.** A common example of facial angle (from Jeffries, ref. 4).

these heads on a horizontal line, I added the facial lines of the faces, with their different angles; and immediately upon inclining the facial line forward, I obtained a head like that of the ancients; but when I inclined that line backwards, I produced a Negro physiognomy, and definitively the profile of an ape, of a Chinese, of an idiot in proportion as I inclined this same line more or less to the rear.”<sup>14</sup>

Harvard professor Stephen Jay Gould wrote that Camper’s famous

“... treatise is remembered today for one primary achievement—the definition of the so-called facial angle, the first widely accepted measurement for comparing the skulls of different races and nationalities. Camper’s facial angle is the traditional beginning of craniometry, or the science of measuring human skulls, a major sub-discipline of physical anthropology.”<sup>12</sup>

Although the facial angle hypothesis became a major plank for racists that is still used today, Meijer concludes that, because Camper was a creationist, the accusation that he “introduced a measurement that sanctioned the opinion that the African was racially inferior” is incorrect.<sup>15</sup> Camper believed that all races were descended from Adam and Eve, and, thus, all are brothers and equal.<sup>16</sup> The racist interpretation of his idea came later, especially after Darwin published his *Origin of Species* in 1859. Nonetheless, Camper’s research was the basis of the later work that eventually became scientific racism.

Another researcher, Dr Charles White, took an interest in facial angle when he noticed that a friend’s skull collection could be lined up by facial angles and, starting with the smallest facial angle, the result was a progression from monkey, to orangutan, to African, to American Indian, to Asiatic, and last, to an European.<sup>17</sup> White then reasoned that Europeans were the highest and Africans the lowest on the evolutionary scale.<sup>17</sup> White concluded “that Nature would not employ gradation in one instance only, but would adopt it as a general principle.”<sup>17</sup>

White then composed a “lengthy catalogue of the particular ways in which the Negro more closely resembled the ape than did the European.”<sup>17</sup> He concluded a major difference was that Africans had a smaller brain capacity than Europeans. He eventually produced an enormous study called *An Account of the Regular Gradation in Man, and in Different Animals and Vegetables; and From the Former to the Latter* (1799). In this book he wrote that every person who has studied Natural History

“... must have been led occasionally to contemplate the beautiful gradation that subsists amongst created beings, from the highest to the lowest. From man down to the smallest reptile ... Nature exhibits ... an immense chain of beings, endowed with various degrees of intelligence and active powers, suited to their stations in the general system.”<sup>18</sup>

Jordan concluded that White’s work was critical in spreading scientific racism:

“Dr. Charles White’s book was of considerable importance not only because it was read (not widely but in important quarters) in America but because it established a striking precedent for grounding opinions about the Negro in the ostensibly ineluctable facts of comparative anatomy. His case for Negro inferiority rested upon an unprecedented if not always reliable array of physiological detail.”<sup>19</sup>

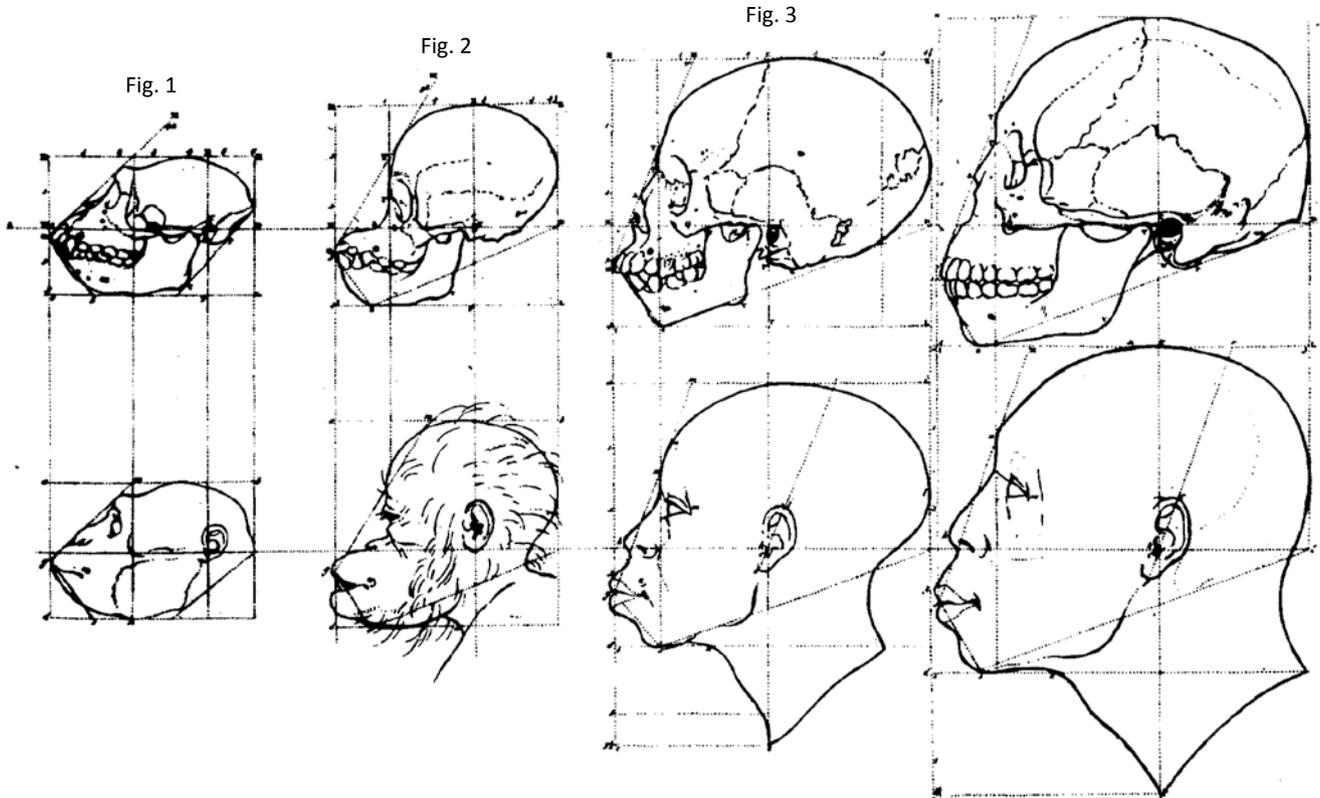
Other researchers, such as German anatomist Samuel Soemmerring, continued this line of research until a

“... racial hierarchy now seemingly based on genuinely scientific insights was established, and ‘Camper’s facial angle’ became the means most often used in physical anthropology to demonstrate the superiority of the White race.”<sup>20</sup>

The facial angle idea was soon incorporated into phrenology. For example, an article in *The Phrenological Journal* by an author given as “Cranium” includes the illustration commonly found in 19<sup>th</sup> century literature ranking life from simple to complex, from snakes to humans. It also ranks humans from inferior to superior.<sup>21</sup> The author shows photos of actual skulls of a “civilized” Caucasian and an African, that he called a “savage”, one of “the lower classes of men” (see figure 2).<sup>22</sup>

### How facial angle was measured

The common method of determining facial angle was to draw a line from the occipital condyle along the floor of the nostrils, which was then intersected by a second line that touched the most prominent parts of the forehead and upper jaw. The intersected angle is called the facial angle.<sup>23</sup> The angle supposedly ranged from under 70° for Africans to about 100° for the highest race, the Caucasians.<sup>2</sup>



**Figure 2.** Camper's facial angle diagram (from Camper, ref. 10).

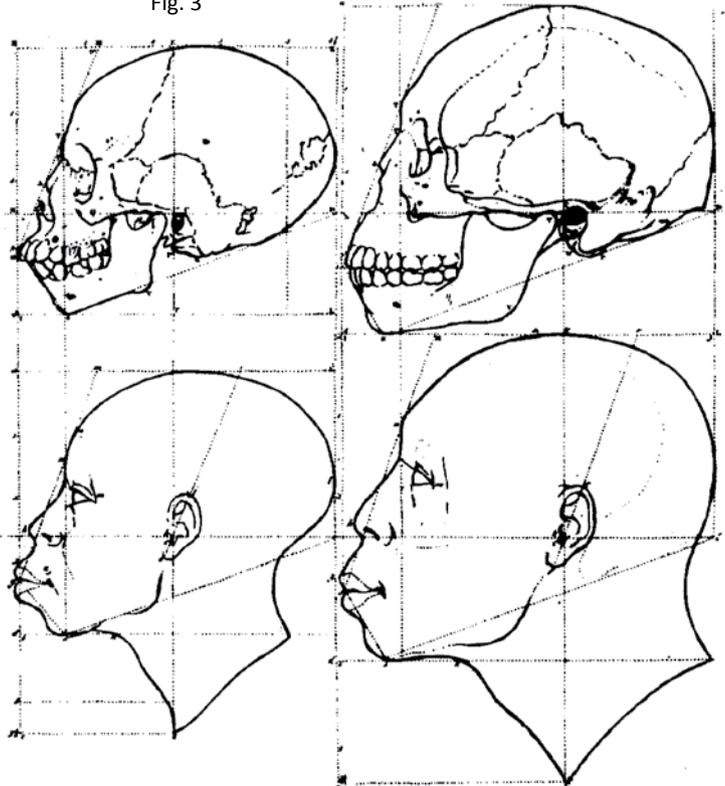
This measurement was used by evolutionists for decades to prove an inferiority-superiority hierarchy and is still used in racist literature today.<sup>24</sup>

Professor Dexter wrote that, although in the West the facial angle theory has occupied the attention of philosophers since antiquity, he concluded that facial angle proponents now had evidence of the intellectual differences in human races and, thus, had proof of the theory's validity (1874, p. 588).<sup>1</sup> He then explained how facial angle is related not only to intelligence and brain complexity, but to the evolutionary progression of human traits. His major conclusion was that evolution from the lowest to the highest vertebrate progressed through almost "imperceptible variations", as Darwin's theory required.<sup>25</sup> He concluded: "In every vertebrate animal ... are two factors, the physical and mental; the facial angle is the typical expression or exponent of the relative strength or condition of each."<sup>26</sup> The racial implications were very clear:

"The profile of the idiot is ... next introduced in the cut, to illustrate the influence upon the size and shape of the *cranium*, or skull, that an arrest of brain development has wrought, and which corresponds to the mental manifestations of its subject."<sup>26</sup>

Even the level of "stupidity" of a human was associated with the facial angle—the greater the angle, the more stupid the subject.<sup>27</sup> Dexter then presented three human profiles that "represent the savage, the half-civilized, and the *cultivated* races of man." The first view, the picture "... next to the view of the idiot, is a drawing

Fig. 3



from a correct engraving of the celebrated North American Indian chief Black Hawk, and corresponds in brain capacity, facial angle, and mental powers, very nearly to the other savage races, viz., the Malayan and Ethiopian. The next that is represented in the cut is the half-civilized Mongolian race, illustrating very nicely the ratio of the two factors physical and mental. The last is the representation of the highly-cultivated Caucasian race, and is a correct profile view of one of the most illustrious statesmen that this or any other nation ever possessed—that of Daniel Webster."<sup>26</sup>

For adult humans, the facial angle varied from 65° to 85°, and the former is close to monkeys (see figure 4). Furthermore the angle can be extended beyond humans "as the Greeks have done in their representations of the Deity" but beyond 100°

"... the head would appear deformed. That angle, according to Camper, constitutes the most beautiful countenance; and hence he supposes the Greeks adopted it. 'For,' says he, 'it is certain no such head was ever met with, and I cannot conceive any such should have occurred among the Greeks, since neither the Egyptians, ... nor the Persians, nor the Greeks themselves, ever exhibit such a formation on their medals, when they are representing the portrait of any real character.'"<sup>28</sup>

Another researcher, Professor John Kennedy, compared the baboon and an African, finding that the baboon facial angle is about  $58^\circ$ , the African  $70^\circ$ , and the European  $80^\circ$ .<sup>29</sup>

By 1898 the facial angle was used to measure human “degeneracy”. Talbot noted that a chimpanzee has a facial angle of  $40^\circ$  to  $50^\circ$  because the jaw occupies two-thirds of the skull and the brain only one third. Africans had angles of close to  $70^\circ$  compared to  $75^\circ$  to  $80^\circ$  for Caucasians because the brain was encroaching and the jaw receding.<sup>30</sup> Although Talbot agrees that the general facial angle is solid evidence for macroevolution, he concluded it is “not an ideal from whence to study face degeneracy”—other factors, such as the shape of the ear pina may be more important.<sup>31</sup>

### Demise of the theory

Even in 1848 it was recognized that facial angle measurement was “one of the most simple (though often insufficient) methods of expressing ... the relative proportion of the cranium and face.”<sup>28</sup> Lawrence noted that normal maturation changes the facial angle—for children the facial angle was as high as  $90^\circ$ —a factor often ignored in research in this area. Other factors that caused the demise of the theory include the advancement of scientific knowledge, the Civil Rights Movement, and a realization that the drawings used to illustrate the idea were horribly distorted, as is obvious in figures 2, 3 and 4.

One of the first opponents of the facial angle theory, as well as the ‘Negro-inferiority’ claim, was President Samuel Stanhope Smith of Princeton University. His motivation was his belief that a “sound study of natural philosophy could only confirm the revealed Word” of God. He concluded that all “mankind constituted a single specie and that human varieties had come to differ in appearance through the operation of natural causes.”<sup>32</sup> He then attempted to challenge Charles White and others, concluding that his critics

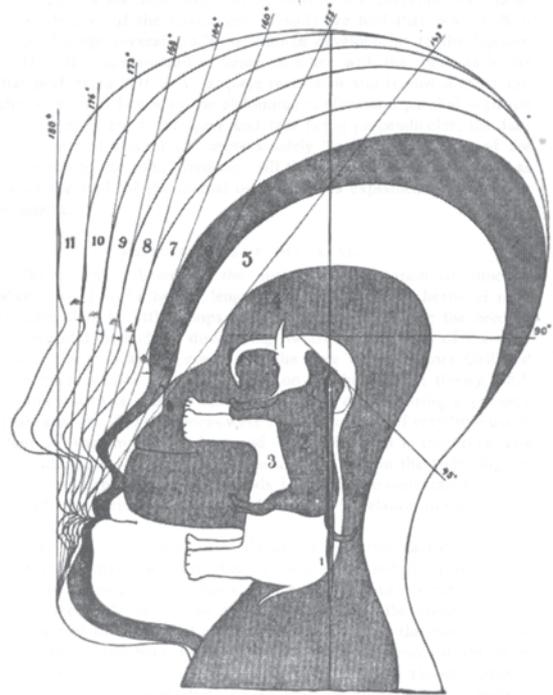
“... failed to take into account the changes which the American environment was producing especially in domestic slaves and free Negroes. Was the formation of the jaw, the teeth, or the nose of the Negro of inferior quality? ... ‘in the United States, the physiognomy, and the whole figure and personal appearance of the African race is undergoing a favorable change.’ ... but among the domestics of the South and even more among the free Negroes of Princeton are limbs ‘as handsomely formed as those of the inferior and laboring classes, either of Europeans, or Anglo-Americans.’”<sup>33</sup>

Smith added that “All this was written in defense of the Negro, but in effect Smith was denying *inherent* inferiority while conceding *present* inferiority.”<sup>33</sup> Smith, Jordan concludes, was actually affirming human “equality in the *brotherhood* of man as embedded in the story of Genesis.”<sup>34</sup> When skeptics objected to the racial implications of the face angle theory on the basis of the Bible’s account of creation, White and others argued that the Bible is not a “handbook of natural history.”<sup>35</sup>

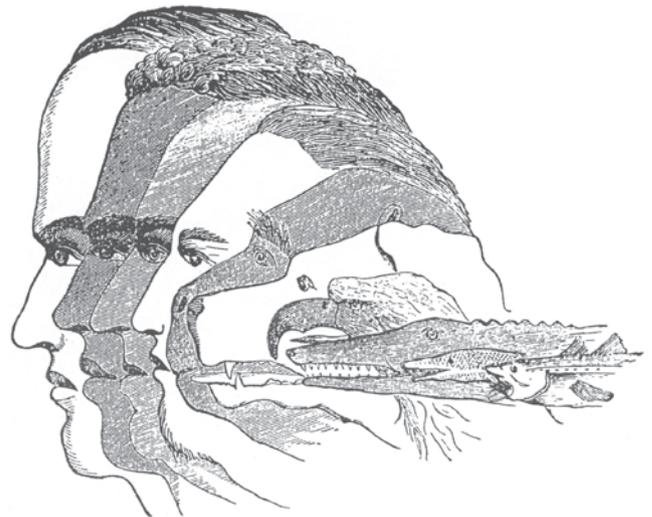
Nonetheless, more and more research has documented the fact that analysis of careful measurements showed that the theory was false because there were far too many exceptions to make valid generalizations.

### Historical influence in the propagation of evolution

Like many ideas (Haeckel’s embryos, Piltdown man, etc.) the facial angle was vital in the early years to propagate evolution, yet its falsification did not result in the demise



**Figure 3.** An example of facial angle in a phrenology article (from *Cranium*, ref. 21).



**Figure 4.** An example of a bluntly evolutionary racist use of the facial angle concept drawn after the publication of Darwin’s 1871 book *The Descent of Man* (from Dexter, ref. 1, p. 589).

of evolution. Evolution had already gained prominence in the public arena, and it was plastic<sup>36</sup> enough to abandon many of the major ‘pillars’ that established it in the public consciousness in the first place. It was also important in justifying racism for generations even after it was shown to be wrong. Stepan notes that the facial angle “was maintained as a central measure of racial worth” for many decades after it was falsified.<sup>37</sup> Meijer wrote that the facial angle theory “was used to support highly speculative racial theories more than a century after” Petrus Camper died.<sup>38</sup> Unfortunately, the historical importance of such ideas for evolution and racism has to some extent been conveniently “forgotten”.<sup>39</sup> Fortunately, persons such as Stephen Jay Gould and others occasionally remind us of the historical importance of the facial angle idea for both evolution and racism.

### Summary

The facial angle system was widely considered valid for both documenting and demonstrating the evolution of all life from single cells.<sup>40</sup> Even animals were classified as close to, or far away from, humans by their facial angle.<sup>41</sup> Furthermore, the facial angle was “one of the main initiators of racial craniology, which emerged during the nineteenth century” to justify racism.<sup>10</sup>

As research accumulated, though, the evidence increasingly documented the fact that far too many exceptions existed. Often only cases that supported the theory were selected, and those that did not were ignored. Another reason for its demise was that facial angle has long been connected with phrenology, the now discredited ‘science’ of determining personality by evaluating skull bumps and indentations.<sup>42</sup>

### References

- Dexter, R., The facial angle, *Popular Science Monthly* 4:588, 1874.
- Haller, J., *Outcasts from Evolution*, University of Illinois Press, Chicago, IL, p. 9, 1971.
- Lawrence, W., *Lectures on Physiology, Zoology, and the Natural History of Man*, Foote and Brown, Salem, MA, pp. 115, 146–147, 289–291, 1828.
- Jeffries, J.P., *The Natural History of the Human Races*, Edward O. Jenkins, New York, p. 347, 1869.
- Gould, S.J., Petrus Camper’s angle, *Natural History* 96(7):14, 1987.
- de Gobineau, A., *The Inequality of Human Races*, tr. Collins, A., The Noontide Press, Los Angeles, CA, [1854] 1966.
- Lawrence, ref. 3, p. 148.
- Lawrence, ref. 3, p. 115.
- Haller, ref. 2, pp. 1–228.
- Camper, P., *Dissertation on the Natural Varieties Which Characterize the Human Physiognomy*, 1792.
- Meijer, M.C., Facial angle; in: Spencer, F., *History of Physical Anthropology an Encyclopedia*, Garland, New York, p. 373, 1997.
- Gould, ref. 5, p. 12.
- Greene, J.C., *The Death of Adam: Evolution and Its Impact on Western Thought*, The Iowa State University Press, Ames, IA, p. 19, 1959.
- Quoted in Greene, ref. 13, pp. 190–191.
- Meijer, ref. 11, pp. 373–376.
- Gould, ref. 5, p. 18.
- Jordan, W.D., *The White Man’s Burden*, Oxford University Press, New York, p. 199, 1974.
- Jordan, W.D., *White over Black*, University of North Carolina Press, Chapel Hill, NC, p. 499, 1968.
- Jordan, ref. 18, p. 501.
- Meijer, ref. 11, p. 376.
- Cranium, A., The brain and skull, *The Phrenological Journal and Science of Health* 122(7):206, July 1909.
- Cranium, ref. 21, pp. 208–209.
- Dexter, ref. 1, p. 587.
- Note the illustration in Jeffries, ref. 4, p. 347.
- Dexter, ref. 1, p. 590.
- Dexter, ref. 1, p. 591.
- Lawrence, ref. 3, p. 147.
- Lawrence, ref. 3, pp. 148–149.
- Kennedy, J., *The Natural History of Man; or Popular Chapters on Ethnography*, John Cassell, London, pp. 17–18, 1860.
- Talbot, E.S., *Degeneracy: Its Causes, Signs, and Results*, Walter Scott, Paternoster Square Charles Scribner’s Sons, London, p. 182, 1898.
- Talbot, ref. 30, pp. 193, 212–218.
- Jordan, ref. 18, p. 487.
- Jordan, ref. 17, p. 201.
- Jordan, ref. 18, p. 488.
- Jordan, ref. 18, p. 502.
- As ReMine commented: “Evolutionary theory predicts nothing . . . Rather, the theory adapts to data like a fog adapts to landscape.” ReMine, W., *The Biotic Message: Evolution versus Message Theory*, St Paul Science, St Paul, MN, p.350, 1993.
- Stepan, N., *The Idea of Race in Science: Great Britain 1800–1960*, Archon Books, Hamden, CT, p. 34, 1982.
- Meijer, M.C. Race and aesthetics in the anthropology of Petrus Camper (1722–1789). Amsterdam: Rodopi.
- Wolpoff, M. and Caspari, R., *Race and Human Evolution: A Fatal Attraction*, Simon and Schuster, New York, 1997.
- Talbot, ref. 30, p. 192.
- Lawrence, ref. 3, p. 116.
- Cranium, ref. 21, pp. 205–216.

---

**Jerry Bergman** has nine academic degrees including two Ph.Ds. His major areas of study for his graduate work were in biology, chemistry, psychology, and evaluation and research. He graduated from Wayne State University in Detroit, Medical University of Ohio in Toledo, University of Toledo and Bowling Green State University. A prolific writer, Dr Bergman has taught biology, chemistry and biochemistry at Northwest State in Archbold, Ohio for over 24 years. He is now an adjunct associate professor at The University of Toledo Medical College.