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## NINETEENTH-CENTURY CRANIOLOGY: THE STUDY OF THE FEMALE SKULL

ELIZABETH FEE

By the 1860s the women's rights movement was being noticed as a potentially serious threat to social order in England. Women were organizing social reform groups, speaking on public platforms, publishing new journals, criticizing marriage and divorce laws and trying to enter exclusively male professions. Educational reformers demanded coeducation and the admission of women to universities. Most disturbing of all, in 1867 John Stuart Mill introduced a women's suffrage amendment to the Representation of the People Bill in Parliament.

In 1868, Paul Broca, one of Europe's most prestigious anthropologists, said they must begin to study the "condition of women in society."<sup>1</sup> Unchecked female militancy threatened to produce a "perturbation of the races" and to divert the orderly progress of evolution. The subordinate position of women had for too long rested on easy assumptions about female inferiority; this inferiority must now be scientifically investigated.

The men of the London Anthropological Society agreed that the doctrine of the intellectual equality of women was an absurdity; such "foolish and mischievous flattery" of the other sex violated nature and would have "a most baneful effect in unsettling society."<sup>2</sup> Reformers like Mill were seen as petty tyrants seeking to remake women in their own image; the good mothers of England must be protected from their machinations. Echoing Broca, McGrigor Allan, a rather undistinguished member of the

<sup>1</sup> Paul Broca, "On anthropology," *Anthrop. Rev.*, 1868, 6: 50.

<sup>2</sup> Nature and society were usually closely identified in discussions of sexual equality: "Any effort to obliterate this difference [between the sexes], or to assimilate the nature of the two, by engaging either in the pursuits proper only for the other, are but attempts to violate nature and as such can never be successful, except to prove the folly and futility of all such exertions." George Harris, *J. Anthropol. Soc.*, 1869, 7: cxcv. The feminist movement opposed the interests of both Nature and society: "No distinctions in the minds of men and women! Nature flatly contradicts the absurd assertion, and warns against encouraging this foolish and mischievous flattery of women . . . As it is these doctrines have a most baneful effect in unsettling society . . . Thousands of years have amply demonstrated the mental supremacy of man, and any attempt to revolutionise the education and status of women on the assumption of an imaginary sexual equality, would be at variance with the normal order of things, and as Dr. Broca says, induce 'a perturbation in the evolution of races.'" J. McGrigor Allan, *J. Anthropol. Soc.*, 1869, 7: ccxv, ccxiii.

London Society, urged his colleagues to turn their scientific talents to this social problem: "The assertions and claims put forward under the term "Woman's Rights," are a challenge to anthropologists to consider the scientific question of women's mental, moral, and physical qualities, her nature and normal condition relative to man. Nowhere, then, can this question be more appropriately and profitably discussed than in the Anthropological Society."<sup>3</sup> A number of anthropologists set out to use their scientific knowledge and status to attack the arguments of the proponents of female emancipation. Why were they so eager to do so?

The profound fear of the "masculine woman" cannot here be analyzed; in lieu of psychoanalytic or political interpretations we shall simply accept Allan's contention that a masculine man, "a big, rough, hairy, he-creature, brave as a lion, strong as a horse, with the digestion of an ostrich, and a beard like a bull-buffalo's," would want a "soft, gentle, yielding, thoroughly feminine woman" and would therefore be ill-disposed towards the noisy feminists.<sup>4</sup> In the guise of defending true womanhood, the English anthropologists wanted to protect women from the false doctrines of reformers by presenting the true facts and natural laws which governed woman's role. Indeed, the emotional level of the debate demanded that balance be restored by the cool light of objective reason, and science appeared as the incarnation of rationality and objectivity to the scientists involved. It was obvious to them that the social reformers were anti-scientific. Either the reformers were ignorant of, or afraid of, the facts of anatomy and physiology, for these were seldom mentioned in feminist tracts. Instead, their arguments were couched in abstract terms, such as "justice," "freedom," and "humanity." Concepts of this sort had no place in a scientific vocabulary; it was argued that such language could be used to justify any absurdity: "the very same argument which would introduce woman to man's occupations on the ground of her humanity, would introduce whales on the ground of their mammality, or sticks and stones on the ground of their entity."<sup>5</sup> The scientists believed they were combatting a "metaphysical priesthood" which advocated the "unnatural revolution of the sexes in blind obedience to a purely metaphysical proposition."<sup>6</sup> In contrast, the anthropologists said they

<sup>3</sup> J. McGrigor Allan, "On the real differences in the minds of men and women," *J. Anthropol. Soc.*, 1869, 7: cxvii.

<sup>4</sup> *Ibid.*, p. ccii.

<sup>5</sup> Luke Owen Pike, "On the claims of women to political power," *J. Anthropol. Soc.*, 1869, 7: lvi.

<sup>6</sup> *Ibid.*, p. lv.

wanted simply to assign woman her true place in nature, so that she could live in accordance with her biological destiny. That biological destiny was motherhood; women must be made to understand that motherhood was incompatible with intellectual pretension, economic competition, or the vote.

Since its foundation, the Anthropological Society had refused to admit women to its meetings; indeed, it had earlier broken with the parent Ethnological Society over precisely this issue.<sup>7</sup> A few scientific societies had begun to admit women as members and had thereby endangered their scientific status: the presence of women made the proceedings seem less serious, if more popular. But the anthropologists were also concerned to increase their popularity and revenue, and one of the best ways to do this was to encourage the discussion of controversial political questions. Many members wished to make their science relevant to contemporary social and political issues; anthropology was to be a "practical" science in an age of utilitarianism. The women's movement provided them with an ideal practical issue: topical, yet not sufficiently controversial to create deep splits within the society, for in this case, its members agreed on the basic issues. As Luke Owen Pike expressed it: "science, in order to be worthy of the name, must deal with practical as well as speculative difficulties, and I know of no subject on which it ought to give a more authoritative decision than upon the claims of women to political power."<sup>8</sup>

<sup>7</sup> This claim was made by James Hunt, founder of the Anthropological Society, in his introduction to the English translation of Carl Vogt's *Lectures on Man* (London, 1864). It has been disputed by others; e.g. by Thomas K. Penniman who said, "the break with the Ethnological Society was really on the Negro question": *A Hundred Years of Anthropology*. 3rd ed. rev. (London: Duckworth, 1965), p. 91. It seems safe to assume that the controversy over the admission of women was one of the reasons, if not the only one, for the split. Another is that Hunt and his cohorts had lost the battle for control of the Society to its more senior members who were unwilling to countenance the ambitious schemes of the younger men; they therefore turned in frustration to a separate organization. Certainly members of the new Society were outspoken on political questions and took a right-wing position on both the "Negro question" and the "woman question."

Many scientific societies were discussing the idea of admitting women in this period; the Geographical had already done so and members of the Geological Society considered and rejected such a change. The Anthropological Society had a special reason for wanting to retain its all male-status: many of the anthropological discussions concerned sexual topics which could not be mentioned in the presence of women. In the first issue of the Society's *Memoirs*, for example, three papers dealt with subjects taboo for ladies: Edward Sellon, "On the phallic worship of India," *Anthrop. Soc. Memoirs*, 1863, 1: 327-334; W. T. Pritchard, "Notes on certain anthropological matters respecting the South Sea Islanders," *ibid.*, pp. 332-326; Richard Burton, "Notes on certain matters connected with the Dahoman," *ibid.*, pp. 308-321.

<sup>8</sup> Luke Owen Pike, "On the claims of women to political power," *J. Anthrop. Soc.*, 1869, 7: xlvii.

George Harris, President of the Anthropological Society of Manchester, took up this challenge in 1869 in a paper entitled "On the distinctions, mental and moral, occasioned by a difference of sex."<sup>9</sup> In a rambling discourse on sexuality and generation, Harris introduced Adam and Eve, the angels, and the vegetable and animal kingdoms, before concluding that "the superiority of the male to the female is everywhere seen" and that both God and Nature approved of sexual distinctions. But Harris lacked appropriate and up-to-date scientific data to demonstrate his conclusions; his main authorities were the book of Genesis, Aristotle, and Buffon. The anthropological audience found this paper unsatisfying; one member termed it "a correct moral essay, replete with truisms,"<sup>10</sup> but it was evident that more solid scientific evidence was needed to substantiate the inferiority of women.

In the same year, Luke Owen Pike, a member of the London Anthropological Society, offered a promising suggestion: to investigate the nature of the female mind. Body and mind were understood to be interdependent; must not woman's intellectual capacity be as different as her anatomy? "If there be any truth in science," Pike warned, "the intellect of woman not only has but must have, a certain relation to her structure; and if it could be shown that there exists no difference between the male and female minds, there would be an end of Anthropology."<sup>11</sup>

McGrigor Allan in his 1869 paper, "On the real differences in the minds of men and women"<sup>12</sup> followed this lead. Agreeing with Alexander Walker, he said that women's brains were analogous to those of animals: in them the organs of sense were overdeveloped to the detriment of the brain proper. This explained the observed fact that women were sensitive and emotional, less guided by reason than men. If women were to be educated, their innate intuitive faculties might be destroyed. In the midst of these speculations, Allan suddenly presented "facts"—figures for the proportions of the female skull taken from the new English translation of Carl Vogt's *Lectures on Man*.<sup>13</sup> From these data he concluded that "the

<sup>9</sup> George Harris, "On the distinctions, mental and moral occasioned by the difference of sex," *J. Anthropol. Soc.*, 1869, 7: clxxxix - cxcv.

<sup>10</sup> W. C. Dendy, "Discussion," *J. Anthropol. Soc.*, 1869, 7: cx cvi.

<sup>11</sup> Luke Owen Pike, *op. cit.* (n. 8 above), p. lviii.

<sup>12</sup> J. McGrigor Allan, "On the real differences in the minds of men and women," *Anthropol. Rev.*, 1869, 7: cx cv-cxxix. The reference is to Alexander Walker's *Beauty: Illustrated Chiefly by an Analysis and Classification of Beauty in Woman* (London, 1836), a text popular with mid-Victorian scientists.

<sup>13</sup> Carl Vogt, *Lectures on Man: His Place in Creation, and in The History of the Earth*, edited by James Hunt (London, 1864), translated from the German: *Vorlesungen über den Menschen, seine Stellung in der Schöpfung und in der Geschichte der Erde* (Giessen, 1863).

type of the female skull approaches in many respects that of the infant, and still more that of the lower races."<sup>14</sup> This last observation captured the attention of the anthropologists. Skull-measurement was a well advanced specialty within anthropology, dignified by the name of "craniology." Perhaps craniology was the tool with which scientifically to demolish feminist pretensions.

Craniology more accurately was a collection of techniques for measuring all possible angles and dimensions of the skull than a science with an articulated theory. It was assumed that important insights would eventually emerge from the tables and charts, angles and ratios compiled in a Baconian orgy of quantification. Measurement was glorified as the essential basis of science; both anatomists and psychologists wanted above everything else to be "scientific."<sup>15</sup> If there was more to craniology than measurement for its own sake, it came from the impulse to create a differential psychology. Earlier psychological theory had been concerned with those mental operations common to the human race; the men of the nineteenth century were more concerned to describe human differences.

Phrenology had been the first form of differential psychology to capture popular attention and had exerted a wide influence in the first quarter of the century. According to the inventor of this system, Franz Joseph Gall, the human mind was composed of a large number of different faculties or abilities, each one of which was separately located in a different part of the brain surface.<sup>16</sup> Since the size of a particular portion of the brain surface was a direct measure of the degree of development of the corresponding faculty, and since the skull faithfully followed the outlines of the

<sup>14</sup> Allan, *op. cit.* (n. 12 above), p. cciv.

<sup>15</sup> E. G. Boring has traced the growth of measurement in psychology, especially in the schools of Fechner and Wundt, as part of the desire to give psychology an "unassailable scientific status." I find his general argument particularly applicable to craniology: "Quantification is favored by the desire of investigators to claim the prestige of science for their research. Especially has this motivation operated among the psychologists, insecure because of their heritage from philosophy, and thus repeatedly insisting on the scientific validity of their new experimental physiology." E. G. Boring, "The beginning and growth of measurement in psychology," *Isis*, 1961, 52: 238-257.

<sup>16</sup> For the original and most complete statement of phrenology, see Franz Joseph Gall and Johann Caspar Spurzheim, *Anatomie et physiologie du système nerveux en général, et du cerveau en particulier, avec des observations sur la possibilité de reconnoître plusieurs dispositions intellectuelles et morales de l'homme et des animaux, par la configuration de leurs têtes* (Paris, 1810-19). References to Gall's work will be to the English edition, translated by Winslow Lewis, *On the Functions of the Brain and of Each of its Parts: with Observations on the Possibility of Determining the Instincts, Propensities, and Talents, or the Moral and Intellectual Dispositions of Men and Animals, by the Configuration of their Heads* (Boston, 1835). For a discussion of the phrenological movement and its social and political context, see Oswei Temkin, "Gall and the phrenological movement," *Bull. Hist. Med.*, 1947, 21: 275-321.

underlying brain, the shape and irregularities of an individual skull provided a physical map of that person's set of talents and personality traits. By mid-century, however, physiologists had experimentally shown the functional unity of the cerebrum and thus the untenability of faculty psychology. Phrenology was then relegated to the status of a pseudoscience.<sup>17</sup>

Phrenology was abandoned, but some of its central convictions were later incorporated into craniology. First: the brain was the organ of the mind. Second: the cranium formed a faithful cast of the underlying brain, and measurement of crania could therefore be substituted for direct measurement of the brain. Finally, and most importantly, brain size indicated mental ability. Here, the analogy between brain and muscle was often used: as muscular power increased with the size of the muscle, brain power increased with the size of the brain. Indeed, the association between brain size and ability was only strengthened by the defeat of faculty psychology; now that the cerebrum was considered a functional unity, the gross size of the brain could serve as a measure of total mental capacity. Brains could therefore be ranked by size on a single scale of mental power or rational ability.

Phrenology had flourished because of the demand for a psychological theory able to explain individual differences. Craniology, with its single-scaled ordering of crania by volume, was less tailored to the demands of an individual psychology but quite suitable for gross racial comparisons, and it was thus of much practical and political importance. In Europe and in the United States, craniological techniques had been used to demonstrate the constitutional inferiority of black people and had provided a rationale for slavery.<sup>18</sup> In England, for example, James Hunt, while

<sup>17</sup> The work of Magendie, Flourens and Müller on the experimental section of animal brains seemed to prove the cerebrum a homogenous organ and thus undermined the theoretical basis of phrenology. Faculty psychology had no place in experimental work. Following the discovery of cerebral localization in 1870, the new "scientific phrenology," as it was termed, used the functions of the Bell-Magendie Law—sensation and motion—and not the complex functions of the phrenologists. For a comprehensive discussion of these and related issues, see Robert M. Young, *Mind, Brain and Adaptation in the Nineteenth Century* (Oxford: Clarendon Press, 1970).

<sup>18</sup> The long and unpleasant saga of racial anthropology has been fully documented elsewhere. See, most recently, John S. Haller, *Outcasts From Evolution: Scientific Attitudes of Racial Inferiority, 1859-1900* (Urbana: University of Illinois Press, 1971). Also William Stanton, *The Leopard's Spots: Scientific Attitudes toward Race in America, 1815-59* (Chicago: University of Chicago Press, 1960); Herbert H. Odom, "Generalizations on race in nineteenth century anthropology," *Isis*, 1967, 58: 5-18; George W. Stocking, "The persistence of polygenist thought in post-Darwinian anthropology," *Race, Culture, and Evolution: Essays in the History of Anthropology* (N.Y.: Free Press, 1968), pp. 42-68.



President of the Anthropological Society in 1863, had written a paper, "On the Negro's place in Nature," in which he argued that "there is no doubt that the Negro's brain bears a great resemblance to a European female or child's brain and thus approaches the ape far more than the European, while the Negress approaches the ape still nearer."<sup>19</sup> Hunt blamed ideas of human equality on an uncritical acceptance of the Bible but asserted that, given the new scientific knowledge, those advocating racial equality could no longer be excused on the grounds of ignorance.

In searching for scientific arguments to combat the women's movement, the members of the Anthropological Society had been unnecessarily casting about in the dark. Craniology, triumphant as a method of racial comparison, was waiting to be put to new applications. Female skulls could now be submitted to the craniological calipers.

The decision to base the anatomical argument for female inferiority on cranial size and shape seemed promising at first. On the average, female brains did weigh less than male brains, and female crania were smaller than male crania. No surprise here: the whole female skeleton was smaller and each bone proportionately so, the cranium being no exception. If intelligence depended on cranial size, women must certainly be less intelligent than men.

This logic had one fatal flaw, which surfaced as the "elephant problem." If either the absolute size of the brain or cranial volume was to be taken as a measure of intelligence, then the elephant and the whale must be the lords of creation. They possessed brains much larger than that of man. Some craniologists tried to finesse the elephant problem by asserting that the relative weight of the brain to the body was the true measure of intelligence. Napoleon's brain, for example, was small on an absolute scale, but large in relation to his body weight. Disturbingly though, some measurements suggested that in relation to body weight, the female brain was larger than the male.<sup>20</sup> Children, females, birds, small monkeys, and

<sup>19</sup> James Hunt, "On the Negro's place in Nature," *Anthrop. Soc. Memoirs*, 1863, 1: 17.

<sup>20</sup> Samuel Thomas von Soemmerring, *Vom Hirn und Rückenmark* (Mainz, 1788), is usually referred to as the first author of this claim. See also, Frederick Tiedemann, "On the brain of the Negro, compared with that of the European and the orang-utan," *Phil. Trans.*, 1836, 126: 497-527; and Carl Vogt, *Lectures on Man*, p. 84. Paul Topinard recalculated Boyd's tables of sex differences in brain weight to show that, in relation to body weight, figures for both sexes were approximately equal. (Robert Boyd, "Tables of the weights of the human body and internal organs in the sane and insane of both sexes at various ages, arranged from 2616 post-mortem examinations," *Phil. Trans.*, 1861, 151: 241-262). However, Topinard also pointed out that by this index, a person who lost weight would thereby become more intelligent. Paul Topinard, *Éléments d'anthropologie générale* (Paris, 1885), p. 530. Other objections to the index had much earlier been raised by Gall, *On the Functions of the Brain*, vol. 2, pp. 185-188.



Napoleon must all share the laurels of high intelligence if this indicator were to be accepted. The great French naturalist of the early nineteenth century, Georges Cuvier, had himself wrestled with this problem and had concluded that the best measurement of intellectual ability was given by the relative proportions of the cranial bones to the bones of the face, as a measure of the degree to which the organ of thought prevailed over the external senses.<sup>21</sup> But this suggestion was found equally unsatisfying, for here, too, the birds, ant-eaters and bear-rats proved superior to man.

Thus, neither the absolute size of the brain nor its ratio to body weight seemed satisfactory. Some investigators ignored the problems and continued to work with one or other of these determinants; others shelved the simple measurements and began to look for more complicated but more reliable indices.

The German craniological literature was technically more sophisticated than the English and thus the English anthropologists turned to the Germans for help. The Anthropological Society translated several German papers relevant to human sexual differences in the conformation of the cranium, including the important papers published by Alexander Ecker and Hermann Schaaffhausen in 1868.

Schaaffhausen's paper, "On the primitive form of the human skull,"<sup>22</sup> established a set of criteria by which to differentiate primitive and advanced skulls. He began by postulating that male skulls were more advanced than female ones, just as European skulls were more advanced than those of other races, adult skulls than those of children, and human skulls than those of animals. Those characteristics shown by the skulls of animals, children, women, or the lower races could therefore be regarded

<sup>21</sup> Georges Cuvier, *Leçons d'anatomie comparée*, 2nd ed. (Paris, 1837), vol. 2, pp. 159-162. Cuvier argued that the size of the facial bones demonstrated the extent to which a species (or individual) was dominated by the senses, particularly those of smell and taste: "Les deux organes qui occupent la plus grande partie de la face sont ceux de l'odorat et du goût. Plus les organes de ces deux sens sont développées, plus la face acquiert de volume, plus sa proportion avec le crâne est à son avantage. Au contraire, plus le cerveau grandit, plus le crâne qui le contient augmente en capacité; plus il devient considérable en comparaison de la face." *ibid.*, p. 159. Franz Joseph Gall pointed out many of the difficulties and anomalies of Cuvier's scale, among them, the fact that whereas Voltaire and Kant had had large heads and small faces, Montaigne, Leibnitz and Franklin had had large heads and large faces. F. J. Gall, *On the Functions of the Brain*, vol. 2, pp. 192-193.

<sup>22</sup> Hermann Schaaffhausen, "On the primitive form of the human skull," *Anthrop. Rev.*, 1868, 6: 412-431; translated from Hermann Schaaffhausen, *Ueber die Urform des menschlichen Schädels, ein beim anthropologischen Congresse in Paris gehaltener Vortrag, abgedruckt in der Festschrift der Niederrheinischen Gesellschaft für Natur- und Heilkunde zur fünfzigjährigen Jubelfeier der Universität Bonn* (Bonn, 1868).

as “primitive.” A trait possessed by more than one of these latter groups—by both women and children for instance—could be identified with more confidence as a primitive trait than if it were possessed by either group alone. After due perusal, Schaaffhausen found that female skulls had several traits in common with other inferior orders: “the projection of the parietal protuberances, the lesser elevation of the frontal bone, the shorter and narrower cranial base, and . . . the more elliptical dental arch and the inclination to prognathism.”<sup>23</sup> These then, were signs of incomplete development.

Other investigators agreed with Schaaffhausen’s thesis that female skulls were relatively undeveloped while not always accepting his specific findings. His assertion that female skulls were prognathic was one that met with resistance. The term “prognathic” meant that the skulls had a small facial angle; the facial angle being the angle between the facial plane and the plane of the base of the skull. First invented by the Dutch anatomist, Peter Camper, this index was used to arrange the skulls of different races on a scale believed to represent their relative development. European man had the largest facial angle while other races fitted into a descending series leading eventually to the anthropoid apes, whose facial angle was very small. Those skulls which occupied the higher part of the scale were said to display *orthognathism*; those lower down, *prognathism*.

Had female skulls been prognathic, this would have put them on a par with the inferior races. However, in the same year, 1868, Alexander Ecker, in his paper “On a characteristic peculiarity of the female skull, and its significance for comparative anatomy”<sup>24</sup> had found female skulls to be distinguished by *orthognathism*. Rather than concede to women this sign of superior development, Ecker argued that marked orthognathism, being also possessed by children, was in its own way an indication of inferiority. White women were perhaps superior to animals and black men, but they were still no better than children.

According to Ecker, the female skull exhibited several other infantile characteristics, among them the following: smaller absolute size, lesser development of the processes for muscle attachment, smaller facial bones

<sup>23</sup> Ibid., p. 425.

<sup>24</sup> Alexander Ecker, “On a characteristic peculiarity in the form of the female skull, and its significance for comparative anthropology,” *Anthrop. Rev.*, 1868, 6: 350-356. Trans. from A. Ecker, “Ueber eine charakteristische Eigenthümlichkeit in der Form des weiblichen Schädels und deren Bedeutung für die vergleichende Anthropologie,” *Archiv für Anthropologie*, 1866, 1: 81-88.

in comparison with the cranium, lesser cranial height, a flatter cranial roof, a more perpendicular forehead, and predominance of the cranial roof over the cranial base.<sup>25</sup> These indices proved woman to be “intermediate in position between man and child.” Perhaps not every female skull resembled the infant’s but Ecker claimed this as the ideal type: “We need not be surprised that we do not find this female type equally pronounced in every head, just as little as we find in every male figure the masculine habitus. But that this form occurs so well pronounced in heads which we designate beautiful and womanly, proves that this form is typical for the female sex.”<sup>26</sup> Ugly women, intellectual women, women with large brains or large facial bones were exceptions, but all could be disregarded as they were not true representatives of the sex. Ecker had succeeded in translating the female stereotype—woman as beautiful child—into a craniological profile. Whenever skulls could be found approximating this type, they could now be identified as female. The vision of woman as child, and thus classed with the lower races in the backwaters of the evolutionary tide, was to prove appealing. The conclusions of Ecker and Schaaffhausen, although their findings with respect to the facial angle had been contradictory, had yet reinforced each other on a deeper, political level: both proved that women were incomplete, undeveloped, anatomically incapable of equality with men.

The two conceptions of woman, as primitive and as infant, managed to coexist fairly successfully, without causing significant interpretive tension. Those who demonstrated affinities between woman and child had no real quarrel with those who emphasized her resemblance to the Negro male or Australian aborigine. The female, the child and the “savage” were all closely identified in terms of contemporary stereotypes. Beneath their superficial differences, all shared the same roles and possessed the same psychological characteristics. As F. Pruner, the French craniologist, wrote: “The Negro resembles the female in his love for children, his family, and his cabin” and, again, “the black man is to the white man what woman is to man in general, a loving being and a being of pleasure.”<sup>27</sup> James Hunt had cited the latter comment with approval in

<sup>25</sup> Ibid., *Anthrop. Rev.*, 1868, 6: 351-354.

<sup>26</sup> Ibid., p. 355.

<sup>27</sup> F. Pruner, as cited by Robert Dunn, “Civilization and cerebral development, some observations on the influence of civilization on the development of the brain in the different races of man,” *Trans. Ethnol. Soc.*, 1866, 4: 13-33, footnote p. 25; and James Hunt, “The Negro’s place in Nature,” *Anthrop. Soc. Memoirs*, 1863, 1: 1-60, footnote p. 39.

his 1863 paper on the Negro.<sup>28</sup> Hunt, the President and chief spokesman of the London Anthropological Society, thought the women's movement and the anti-slavery movement equally absurd; since both women and blacks were like children, incapable of looking after themselves, it would be unkind and unwise to force them into an unhappy independence. Black men, like white women, were considered intuitive, but lacking in rational capacity. Each group had to be kept in their proper place, either by threat or education, as they could not function as equals in normal, civilized society. They were, in fact, only benevolent beings when properly trained; for as children could be "little savages," so could women be "vile Amazons" and blacks, uncivilized "brutes."

Ecker's general hypothesis—that female skulls were infantile in form—became a standard of the literature but, in time, his specific results were questioned. He had argued, for example, that the female cranial height was less than the male. Since cranial height was often linked to intelligence, this assertion took on particular significance. Yet it was disputed by John Cleland in his paper of 1870: "An inquiry into the variations of the human skull . . ." <sup>29</sup> Cleland warned that since Kaffirs, Negroes and Australians possessed high foreheads, cranial height could not be regarded as a criterion of superior intellect. Obviously, the European races were superior to these primitive people; the criterion of intelligence must be wrong. To replace cranial height, he invented a new index which effectively demonstrated the infantile state of the female skull and yet did not violate racial propriety. This new measure was the angle between the base line of the skull and the vertebral column. As a child grew older, his head, according to Cleland, became increasingly tilted backwards in order to balance the growing weight of the frontal lobes of the brain and the facial bones. The male cranium was generally tilted back further than the female; the female angle therefore remained closer to that of the child. Cleland thus vindicated Ecker's conclusion, if not his method: "a specially feminine character may be seen to be given to the skull by the persistence of the form of childhood." <sup>30</sup>

Cleland's index never achieved great popularity partly because, working in Ireland, he was isolated from the main scientific centers and produced no students trained in his technique. In addition, the method was

<sup>28</sup> Hunt, *ibid.*, pp. 37-53. See also citation from J. H. Van Evrie, *Negroes and Negro "Slavery": The First an Inferior Race—The Latter, its Normal Condition* (New York, 1861), p. 10.

<sup>29</sup> John Cleland, "An inquiry into the variations of the human skull, particularly in the antero-posterior direction," *Phil. Trans.*, 1870, 160: 117-174.

<sup>30</sup> *Ibid.*, p. 130.

tedious and difficult, and the researcher required both the vertebral column and the skull before he could begin measurements. Normally, only the skull was needed for craniological work.

Simpler techniques were preferred, one of the most popular being the "cranial" or "cephalic index." This represented the ratio of the maximum breadth of the skull to its maximum length. Skulls with a relatively large cephalic index (round skulls) were termed *brachycephalic*, while those with a small cephalic index (long skulls) were *dolichocephalic*. Negroes were believed to be dolichocephalic; Caucasians, brachycephalic. Children, having rounded skulls, were more brachycephalic than adult males. We can see that here, again, women could not win. Either they had long heads and resembled the despised blacks, or they had round heads and thus proved their affinity to children. Craniologists could not decide between these alternatives: Gall and Welcker thought women were dolichocephalic but Weisbach, Mantegazza and Hamy pronounced them brachycephalic.<sup>31</sup> Topinard suggested an uneasy compromise: woman was less dolichocephalic in the dolichocephalic races but also less brachycephalic in the brachycephalic races.<sup>32</sup> By 1887, however, he had concluded that the attempt to separate the sexes by cephalic index had proved unsuccessful and should be abandoned.<sup>33</sup>

The number of cranial angles and indices multiplied at a prodigious rate in the 1870s, 1880s and 1890s in what may be called the Baroque period of craniology. Each person involved in craniological research employed his own favorite measurements and many contributed new ones to the growing number already in existence. One investigator deemed it necessary to take 5,000 measurements on a single skull.<sup>34</sup> Since a given measurement depended on the precise reference points chosen, as well as on the particular instrument used, there existed a tremendous potential for confu-

<sup>31</sup> Paul Topinard, *Eléments*, p. 375. Also, D. J. Cunningham, "The fissure of Rolando," *J. Anat. Physiol.*, 1891, 25: footnote, p. 21: "Welcker, Broca and Calori hold that the head of the female is more dolichocephalic than that of the male . . . Weisbach, Arnold and Mantegazza, on the other hand, consider that it is the male head that shows the greatest amount of dolichocephaly."

<sup>32</sup> Topinard, *Eléments*, p. 375.

<sup>33</sup> *Ibid.*, p. 376. Topinard did say that "from reason alone" women should be more brachycephalic, since women were expected to show the craniological characteristics of children, but he also pointed out that this prediction was not confirmed by the data. Further, he raised the general objection that the sex of crania were usually unknown and had to be estimated by the craniologist himself: thus putting all statements on sexual differences in crania under a certain suspicion.

<sup>34</sup> Jacques Barzun, *Race: A Study in Modern Superstition* (New York: Harcourt Brace, 1937), p. 161.

sion, a potential increased by the fact that over six hundred different measuring instruments were available.<sup>35</sup>

Craniologists would frequently arrive at diametrically opposite conclusions. Often the contradictions arose because they had either been defining their terms differently or had used different reference points for their measurements. Most of the samples used were statistically inadequate; many results would have been invalidated had the investigator had access to a large number of crania. Yet the whole enterprise thrived despite annoying setbacks; as one index failed to measure up to expectations, another appeared, claiming to hold the solution to all earlier problems. Indeed, new techniques and measurements began to appear at an even faster rate than others were relegated to oblivion.

As craniological research became ever more complicated, technical and sophisticated, it seemed to many to have become increasingly alienated from the real issues it had been expected to solve; important social and political questions were being swallowed up in masses of detailed measurements and in endless disputes over methods and terminology. It was less and less clear that cranial measurements had any direct relationship to intelligence. Emphasis had originally been given to the cranium because of its close association with the brain, but the brain itself had become lost in the morass of facial, coronal and occipital angles, mastoid processes, projection maps and all the other trappings of the new scientific specialty.

A warning signal that all was not well with craniology had come in 1881 when E. B. Tylor expressed dissatisfaction in his Presidential Address to the Anthropological Institute: "Many of us who are not profound anatomists, though sensible of the general value of skull measurements as bearing on race, have been apt to think their study in the hands of craniologists running into unprofitable minuteness and complexity of observation . . ." <sup>36</sup> Tylor phrased his criticism tactfully because he knew he was no anatomist and therefore supposedly unqualified to judge the difficulties of the subject. Such doubts did not trouble a later President of the

<sup>35</sup> Lucile E. Hoyme, "Physical anthropology and its instruments: an historical study," *Southwestern J. Anthropol.*, 1953, 9: 410. For the story of the struggles over the standardization of craniological technique and terminology, see L. H. Dudley Buxton and G. M. Morant, "Essential craniological technique," *J. Anthropol. Inst.*, 1933, 53: 19-47, and G. M. Morant, M. L. Tildesley, and L. H. Dudley Buxton, "Standardization of the technique of physical anthropology," *Man*, 1932, 32: 155-158.

<sup>36</sup> E. B. Tylor, "President's Address," *J. Anthropol. Inst.*, 1881, 10: 453.

Institute, Alexander McAlister—Professor of Anatomy at Cambridge—who bluntly declared in 1892: “craniometric literature is at present as unsatisfactory as it is dull . . . we are forced to echo the apostrophe of Von Torok, ‘Vanity, thy name is Craniology.’”<sup>37</sup> In the 1890s Giuseppe Sergi, Professor of Anthropology at the University of Rome, became so disillusioned with craniology that he returned to a qualitative study of skull shapes or used photographs to indicate form; all quantitative measurements had, he believed, proved themselves equally worthless.<sup>38</sup> Alfred Russel Wallace in *The Wonderful Century* (1898) made a damning assessment of craniological achievement: “Enormous collections of skulls were formed; they were figured and accurately measured, were classified as brachycephalic or dolichocephalic, and in various other ways, but nothing came of it all . . . Never perhaps was so much laborious scientific work productive of so inadequate a result.”<sup>39</sup>

By the end of the century there was a widespread distrust of anthropological measurements and craniologists were sometimes treated with scorn or amusement. But many still persisted in the belief that with better instruments and more data, some significant results might emerge.<sup>40</sup> One major result of the criticism was the reversion to a small number of simple indices. In this Neo-Classical revival, the linkage between brain size and intelligence was fervently defended even though it also revived old problems. Mental patients, for example, often had very large brains. Topinard explained in 1885 that an abnormal brain development was conducive to both intellectual work and mental instability.<sup>41</sup> Men normally possessed the will and ability to master this danger; women with large brains, being weak and prone to hysteria, tended to die or become mentally ill. To support this “thesis,” Topinard cited the case of

<sup>37</sup> Alexander McAlister, “President’s Address,” *British Association for the Advancement of Science Reports*, 1892, 62: 890.

<sup>38</sup> Giuseppe Sergi’s views on this subject were first elaborated in *La varietà umane: principi e methodo di classificazione* (Torino, 1893). This appeared in English translation as “The varieties of the human species: principles and method of classification,” *Smithsonian Miscellaneous Collections*, 1894, 38: 7-61.

<sup>39</sup> Alfred Russel Wallace, *The Wonderful Century: Its Successes and Failures* (New York: 1898), p. 183.

<sup>40</sup> Charles Myers argued in 1903 that biological measurement was only in its infancy and that, despite the critics, this was clearly to be the wave of the future: “Indeed, if physical anthropology is to be a science, its results must be capable of expression in mathematical formulae. To this end some of the most interesting of the biological work of the age is tending. The traveller and the student of natural history have had their day . . .” Charles S. Myers, “The future of anthropometry,” *J. Anthropol. Inst.*, 1903, 33: 38.

<sup>41</sup> Topinard, *Eléments*, p. 562.



a female doctoral student, of high brain weight, who committed suicide after failing her exams. He thus simultaneously explained the high female suicide rate, the large numbers of women in mental hospitals, and the absence of women of genius. George Romanes, author of *Mental Evolution in Man* (1889), expressed his views on the mental differences between the sexes in an article for *Nineteenth Century*.<sup>42</sup> Female intellectual inferiority, he said, was a consequence of the "missing five ounces of the female brain": "Seeing that the average brain-weight of women is about five ounces less than that of men, on merely anatomical grounds we should be prepared to expect a marked inferiority of intellectual power in the former."<sup>43</sup>

With Topinard and Romanes, the argument had come full circle; the long and technical controversies of anthropologists and craniologists had led back to the single idea with which the whole discussion had begun—that women's brains must be inferior and that this inferiority was somehow linked to size.

But in the early years of the twentieth century, antifeminist anthropologists, who still hoped that craniology and brain measurements could prove socially and politically useful, received the final blow from Karl Pearson and his school of biometricians.

Armed with new and refined statistical techniques, Karl Pearson and his students at University College, London, began a searing criticism of craniological dogma. Although fervent believers in biological measurement, this group did not share the older anthropologists' emotional or political fear of women's rights. Quite the contrary: the two Pearson students who did much of the work on head-size and intelligence were Alice Lee and Marie Lewenz, two of the first women scientists in the field. Pearson himself had gained a reputation as a radical and a free-thinker; in his youth, he had supported both socialism and the emancipation of women and had taken part in a small group of men "whose avowed

<sup>42</sup> George J. Romanes, "Mental differences between men and women," *Nineteenth Century*, 1887, 21: 654-672. By this time, articles published in specialist anthropological journals had become less transparent in their ideological position; authors were less willing to discourse on their feelings about the women's movement. Such opinions, to the extent that they were explicitly stated, were now often reserved for popular articles in the wide-circulation journals. The above article is an example; Romanes says: "Whether we like it or not, the women's movement is upon us, and what we have now to do is to guide the flood into what seem likely to prove the most beneficial channels" (p. 667). He goes on to say that women should be allowed to become educated but not permitted "to set up an unnatural, and therefore impossible, rivalry with men in the struggles of practical life . . ." (p. 668).

<sup>43</sup> *Ibid.*, pp. 654-655.

purpose was to break down the conventional barriers which prevented free discussion of the relations between men and women."<sup>44</sup>

These heretics on the "woman question" had the mathematical training and skills formerly unknown in craniology. Pearson had come to the subject as a mathematician; at the age of twenty-seven he had been appointed to the Chair of Applied Mathematics and Mechanics at University College. Induced by Francis Galton's *Natural Inheritance* (1889) to study correlation, he became impressed by the potential importance of mathematics for the study of biological problems. He invented or perfected a whole array of statistical methods: simple linear, multiple, partial, and curvilinear correlations. The new breed of anthropological statisticians scorned competitors without mathematical training; no longer, they insisted, could craniologists be permitted to misrepresent their appallingly amateurish efforts as science. Anthropometry must be brought to a new level of professionalism. It took five years to effect this transformation.

In 1901 Alice Lee published her first paper, "A first study of the correlation of the human skull."<sup>45</sup> She concluded that there was *no* correlation between skull capacity and intellectual power. Since at this time no independent measure of intelligence existed—Galton himself had assumed that social reputation was an adequate index of intelligence—Lee used a simple trick to convince her readers. She printed the names and cranial measurements of three groups: thirty-five (male) anatomists attending the Anatomical Society meeting in Dublin in 1898, thirty (female) Bedford College students and twenty-five (male) members of the teaching staff of University College. Some of the women students from Bedford College had larger cranial capacities than the eminent and respected anatomists; to have insisted that cranial capacity was an accurate measure of intelligence would have been acutely embarrassing. Lee pushed the point home: if cranial capacity and intelligence were not correlated on an individual basis, then racial and sexual comparisons could have no significance. She further showed that an unavoidable error of about 3% existed in all measurements of cranial capacity because of variations in "packing" the sand or seeds used in volume analysis: this 3% was a significant figure because most measurements of sex differences in cranial capacity fell within this margin of error.

Lee's paper came in for considerable criticism and in 1902, Pearson

<sup>44</sup> Helen M. Walker, "The contributions of Karl Pearson," *J. Amer. Stat. Ass.*, 1958, 33: 15.

<sup>45</sup> Alice Lee, "Data for the problem of evolution in man—a first study of the correlation of the human skull," *Phil. Trans.*, 1901, 196A: 225-264.

published a paper in her support, "On the correlation of intellectual ability with the size and shape of the head."<sup>46</sup> A comparison of the cranial measurements of Cambridge undergraduates with their examination results had shown no significant correlation. A similar experiment on school children strengthened the conviction that "it is impossible to pass judgment from the size of the head to ability or vice versa." In the same year, Lee, Pearson and Marie Lewenz together answered the numerous criticisms of the first two papers, and they recalculated all their tables to show that if cranial capacity was measured relative to body size, the correlation with intelligence was still more insignificant.<sup>47</sup> A protest by two French craniologists, Vashide and Pelletier, that auricular height rather than the total size of the skull was the true measure of intelligence was summarily dismissed: "Frankly we consider the memoir is a good illustration of how little can be safely argued from meagre data and a defective statistical theory."<sup>48</sup> In 1904 another Pearson student, W. R. McDonell, showed that the only significant sexual distinctions in the form of the skull concerned slight differences in the form of the palate and of the eye orbit.<sup>49</sup>

These results might have had less impact had it not been for Pearson's personal influence. Pearson observed no etiquette in rebuffing his rivals and he intellectually horsewhipped those who disagreed with him. Uncompromising in his demands for high standards in craniological work, he set these standards so high that only his students could comply with them. In 1904, he and Lewenz denounced the work of an older generation of craniologists as "dilettantism" and stated that papers uninformed by mathematical statistics were "simply outside the field of science."<sup>50</sup> By 1906, the idea that intelligence was directly linked to skull size or form was dismissed as a pathetic anachronism, a symptom of an earlier, cred-

<sup>46</sup> Karl Pearson, "On the correlation of intellectual ability with the size and shape of the head," *Roy. Soc. Proc.*, 1902, 69: 333-342.

<sup>47</sup> Alice Lee, Marie Lewenz and Karl Pearson, "On the correlation of the mental and physical characters in man, Part 11," *Roy. Soc. Proc.*, 1902, 71: 106-114.

<sup>48</sup> Ibid., p. 108. N. Vashide and M. Pelletier, "Contribution expérimentale à l'étude des signes physiques de l'intelligence," *Comptes Rendus*, 1901, 133: 551-553.

<sup>49</sup> W. R. McDonell, "A study of the variation and correlation of the human skull, with special reference to English crania," *Biometrika*, 1904, 3: 191-244.

<sup>50</sup> M. A. Lewenz and Karl Pearson, "On the measurement of internal capacity from cranial circumferences," *Biometrika*, 1904, 3: 397. The message of this paper could not be clearer: "The day for the old methods is once and forever gone" (p. 368); Barnard Davies' measurements cannot be used for "really scientific work" (p. 377); papers like that of Dr. Beddoes "sensibly lower the already low standard of craniometry" (p. 397).

ulous age: "It is impossible . . . to use head size as a basis for judgment as to intelligence. Of course all this is merely stating in words what is obvious to the biometrician, when he finds a low correlation, but possibly, although I am hardly hopeful, it may help to convince the anatomist and old school anthropologist that head measurements are not of real service as intelligence tests."<sup>51</sup> Thus by 1906, Pearson and his students had demolished the craniological enterprise of measuring human intelligence by the dimensions of the skull.

The underlying rationale for craniological research had now crumbled. But although craniology as a scientific specialty had collapsed under its own weight, the impulse to create a differential psychology remained. The social and political function of differential psychology survived the demise of the particular form it had assumed within nineteenth-century science. In the twentieth century, it was to take on a new shape: mental testing replaced cranial measurement as a method of ordering human beings in an intelligence hierarchy.<sup>52</sup> This new form of differential psychology is now itself under attack, and a second cycle is almost complete: the emergence of a new science, its growth in complexity through the multiplication of measurements, and its eventual collapse under the weight of its own inherent contradictions.<sup>53</sup>

Craniology and intelligence testing fulfilled similar political functions in reinforcing and rationalizing already existing social divisions. Each has its own history, its own internal logic and internal development which can be viewed and described independently of this political context. Each science creates its own rationality and its own form of objectivity, just as each has its own set of tools and techniques. Each science or scientific

<sup>51</sup> Karl Pearson, "On the relationship of intelligence to the size and shape of the head and to other physical and mental characters," *Biometrika*, 1906, 5: 122.

<sup>52</sup> For some of the earliest papers on mental testing, see J. McK. Cattell, "Mental tests and measurements," *Mind*, 1890, 15: 373-380; and A. Binet and V. Henri, "La psychologie individuelle," *L'Année Psychologique*, 1895, 11: 411-415. For the early literature on the use of mental testing to discover differences between the sexes, see Helen Bradford Thompson, "A review of the recent literature on the psychology of sex," *Psychological Bulletin*, 1910, 7: 335-342. An analysis of this form of differential psychology is given in Robert L. Watson, "The individual, social, economic and political conditions for the original practices of detection and utilization of individual aptitude differences," *Revue de Synthèse*, 1968, 89: 355-368.

<sup>53</sup> Arthur R. Jensen's article, "How much can we boost I.Q. and scholastic achievement?" and some of the extensive critiques it has provoked, are reprinted in *Environment, Heredity and Intelligence* (Cambridge, Harvard Educational Review reprints, 1969) and *Science, Heritability and I.Q.* (Cambridge, Harvard Educational Review reprints, 1969). While many of these critiques attack the assumptions and statistical techniques used by modern differential psychology, William F. Brazziel clearly shows their political implications in "A letter from the South," *Environment, Heredity and Intelligence*, pp. 200-208.

sub-specialty is semi-autonomous and particularly in the period of its dominance, appears as the embodiment of rationality and objectivity. Each has its own rules: thus, craniological measurements can be more, or less, accurate. There were craniologists whose research was particularly admired, and whose work was sophisticated, painstaking and careful, and others whose research was less careful, whose techniques were less sophisticated, and whose work was less important. Nevertheless, in the broad perspective, these internal relations of the scientific specialty assume a minor role; more important, are the functions which the science as a whole subserves in legitimizing a given set of social relations. In the case reviewed above, we have seen how craniology served to legitimize and reinforce existing relations between the sexes: the dominance of men, defined as more intelligent and more advanced on an evolutionary scale, and the corresponding subordination of women. And this was only one of a series of social and political distinctions which craniology served to reinforce; equally important, and more generally known, was its function in reinforcing an existing racial hierarchy. It must be stressed that craniology did not in any sense create these social divisions; rather, it reinforced and reproduced them on an ideological level. Yet this function is in itself a powerful one: the sciences hold a special status in the hierarchy of knowledge, a special claim to truth and objectivity not possessed by other disciplines or forms of discourse.

Precisely because of this special status of science, the internal critique of a scientific discipline is important. Karl Pearson, Alice Lee and Marie Lewenz may have had their own ideological reasons for attacking existing craniological research, but their attacks were expressed in the language of that science and spoke to both its underlying assumptions and the inadequacy of its techniques. Their attack was successful in the sense that the old craniological methods were rendered impotent in the establishment of differential psychology.

But the fact that craniology collapsed only to be followed by the reestablishment of differential psychology in a new shape shows that, in a broader sense, it is the underlying social reality that creates the science. As long as there are entrenched social and political distinctions between sexes, races or classes, there will be forms of science whose main function is to rationalize and legitimize these distinctions.