



UNIVERSITY OF CALIFORNIA PRESS  
JOURNALS + DIGITAL PUBLISHING

---

Skeletons in the Closet: The First Illustrations of the Female Skeleton in Eighteenth-Century Anatomy

Author(s): Londa Schiebinger

Reviewed work(s):

Source: *Representations*, No. 14, The Making of the Modern Body: Sexuality and Society in the Nineteenth Century (Spring, 1986), pp. 42-82

Published by: [University of California Press](#)

Stable URL: <http://www.jstor.org/stable/2928435>

Accessed: 04/07/2012 07:07

---

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at  
<http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



University of California Press is collaborating with JSTOR to digitize, preserve and extend access to *Representations*.

<http://www.jstor.org>

## **Skeletons in the Closet: The First Illustrations of the Female Skeleton in Eighteenth-Century Anatomy**

### **Introduction**

IN 1796 THE GERMAN ANATOMIST Samuel Thomas von Soemmerring published in a separate folio what he claimed to be the first illustration of a female skeleton.<sup>1</sup> This was a remarkable claim since Andreas Vesalius and modern anatomists had drawn human skeletons from observation and dissection since the sixteenth century. Though Soemmerring's claim to originality was a bit exaggerated, he was, indeed, among the first illustrators of a distinctively female skeleton. But the importance of his illustration goes beyond the fact that it was one of the first. With his drawing of a female skeleton, Soemmerring became part of the eighteenth-century movement to define and redefine sex differences in every part of the human body. It was in the eighteenth century that the doctrine of humors, which had long identified women as having a unique physical and moral character, was overturned by modern medicine. Beginning in the 1750s, doctors in France and Germany called for a finer delineation of sex differences; discovering, describing, and defining sex differences in every bone, muscle, nerve, and vein of the human body became a research priority in anatomical science. It was as part of this broader search for sex differences that the drawings of the first female skeletons appeared in England, France, and Germany between 1730 and 1790.

What sparked interest in the female skeleton in the eighteenth century? Did portrayals of female bones follow the "clean cut" of scientific objectivity? Or was interest in female anatomy molded by broader social movements? Was there a connection between eighteenth-century movements for women's equality and attempts on the part of anatomists to discover a physiological basis for female "inequality"?

I want to argue here that it was in the context of the attempt to define the position of women in European society that the first representations of the female skeleton appeared in European science. The interests of the scientific community were not arbitrary: anatomists focused attention on those parts of the body that were to become politically significant. When the French anatomist Marie-

Geneviève-Charlotte Thiroux d'Arconville published drawings of the female skeleton in 1759, she portrayed the female skull as smaller than the male skull, and the female pelvis as larger than the male pelvis.<sup>2</sup> This was not, however, simply the product of the growth of realism in anatomy. The depiction of a smaller female skull was used to prove that women's intellectual capabilities were inferior to men's. This scientific measure of women's lesser "natural reason" was used to buttress arguments against women's participation in the public spheres of government and commerce, science and scholarship. The larger female pelvis was used in parallel fashion to prove that women were naturally destined for motherhood, the confined sphere of hearth and home.

"Nature" played a pivotal role in the rise of liberal political thought. In the seventeenth and eighteenth centuries, natural-law philosophers such as Locke and Kant sought to found social convention on a natural basis.<sup>3</sup> Appeals to "the natural reason and dignity of man" provided important philosophical underpinnings for arguments in favor of individual freedom and equality. Yet, when women asked for equality, they were denied it.

It is important to understand how the eighteenth-century denial of civil rights to women could be justified within the framework of liberal thought. To the mind of the natural-law theorist, an appeal to natural rights could be countered only by proof of natural inequalities.<sup>4</sup> In his *Lettres Persanes*, Montesquieu, for example, framed the crucial question: "Does natural law [*loi naturelle*] submit women to men?"<sup>5</sup> Nature and its law were considered above human politics. According to this view, there exists an order in nature that underlies the well-ordered *polis*.<sup>6</sup> If social inequalities were to be justified within the framework of liberal thought, scientific evidence would have to show that human nature is not uniform but differs according to age, race, and sex.

In the course of the eighteenth and nineteenth centuries, the study of the "nature" of woman became a priority of scientific research. The increasing tendency to look to science as an arbiter of social questions depended on the promise that hotly debated social issues—such as women's rights and abilities—could be resolved in the cool sanctuaries of science. When modern science first turned an "impartial" eye to the study of women, however, there emerged a paradox that still plagues women's relationship to science. The "nature" and capacities of women were vigorously investigated by a scientific community from which women (and the feminine) were almost entirely absent.<sup>7</sup> As a consequence, women had little opportunity to employ the methods of science in order to revise or refute the emerging claims about the nature of women. As science gained social prestige in the course of the nineteenth century, those who could not base their arguments on scientific evidence were put at a severe disadvantage in social debate. Thus emerged a paradox central to the history of modern science: women (and what women value) have been largely excluded from science, and the results of science often have been used to justify their continued exclusion.



FIGURES 1 and 2 (*opposite*). Andreas Vesalius, male and female nudes, in *The Epitome* (Basel, 1543).



I want to stress from the outset that it is not my purpose to explain away physical differences between men and women but to analyze social and political circumstances surrounding the eighteenth-century search for sex differences. This study of the first representations of the female skeleton is intended to serve as a case study of more general problems. Why does the search for sex differences become a priority of scientific research at particular times, and what political consequences have been drawn from the fact of difference? As we will see, the fact of difference was used in the eighteenth century to prescribe very different roles for men and women in the social hierarchy. In the course of the eighteenth century, some anatomists were even moved to believe that women held a lowly rank in the natural hierarchy; it became fashionable to find in women the qualities of children and “primitives.” By locating woman’s social worth in her physical nature, anatomists hoped to provide a sure and easy solution to the “woman” problem.

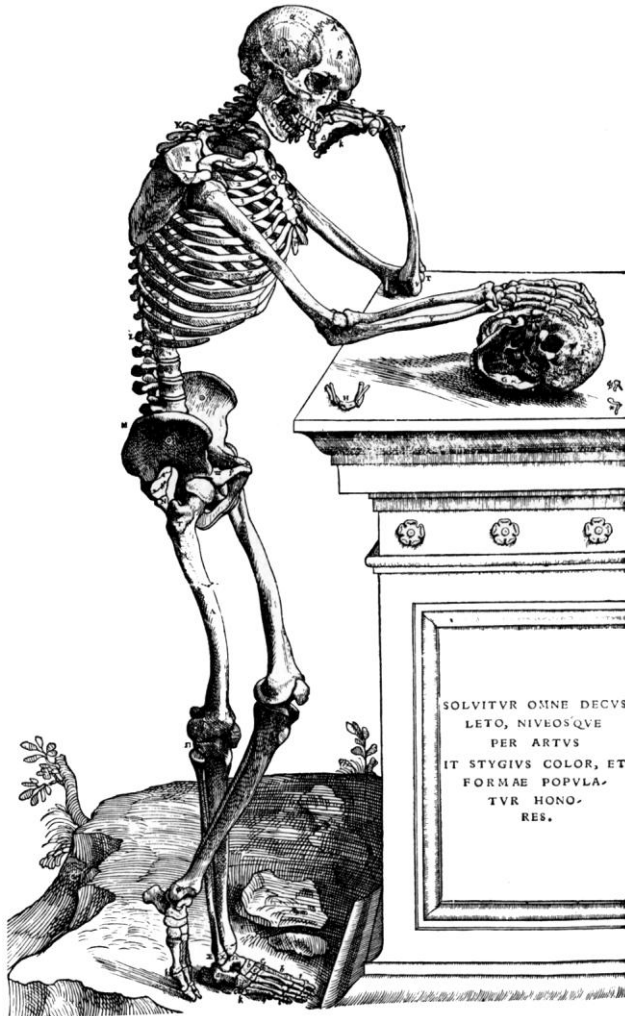
### **Sex Differences and the Rise of Modern Anatomy, 1600–1750**

*L'esprit n'a point de sexe.*  
—François Poullain de la Barre<sup>8</sup>

The identification of sex differences in the human body is not unique to modern times. In the ancient world, Hippocrates, Aristotle, and Galen drew a picture of the nature of woman that provided a thoroughgoing justification of women’s inferior social status.<sup>9</sup> Aristotle argued that women are colder and weaker than men, and that women do not have sufficient heat to cook the blood and thus purify the soul. Galen, following the Hippocratic doctrine of the four humors, believed that women are cold and moist while men are warm and dry; men are active, women are indolent. The medical assumptions of these ancients were incorporated into medieval thinking with few revisions and dominated much of Western medical literature until well into the seventeenth century.<sup>10</sup>

The new science of anatomy that emerged in the sixteenth century had the potential to challenge ancient views of women’s physical and moral nature. Paul Hoffmann and Ian Maclean have argued that there was a limited feminist movement in sixteenth- and seventeenth-century medicine.<sup>11</sup> In 1645, J. P. Lotichium, professor of medicine at the German University of Rinteln, reviewed this feminist literature and stressed that women are perfect in their physical creation and should be considered completely human.<sup>12</sup> In 1673, the French feminist Poullain de la Barre used explicitly medical arguments to buttress pleas for the social equality of women. Women, he wrote, have the same sense organs as men—their eyes see as clearly, their ears hear with the same degree of accuracy, their hands are as dexterous. And their heads, he continued, are the same as men’s. “The

FIGURE 3. Vesalius, bones of the human body, drawn to same scale as figs. 1 and 2, in *The Epitome*.



most exact anatomy has not discovered any difference in that part [the head] between men and women; the brain is the same in both, as are memory and imagination.”<sup>13</sup> The English feminist Mary Astell defended the rational capabilities of women in a similar vein:

If there be any defect in women it cannot be in the Body, (if I may credit the Report of learned Physicians) for there is no difference in the Organ of those Parts, which have any relation to, or influence over the Minds.<sup>14</sup>

Though there were feminist stirrings in Renaissance and early modern medical circles, they were small. By and large, anatomists of the sixteenth and seventeenth centuries did not focus attention on the question of sex difference. As Hilda Smith has pointed out, those whom we today identify as leading figures in

seventeenth-century English medicine—Thomas Willis, Thomas Sydenham, William Harvey—had very little to say about women or sex differences in the human body. The issue of sex differences was taken up only by the more marginal writers of gynecological treatises who continued to rely on the Galenic tradition.<sup>15</sup> Maclean has further pointed out that although Renaissance doctors saw themselves as attacking all ancient authority, they actually merely combined Galenism with enlightened views of women. The continued reliance on ancient authority made difficult any real change in attitudes toward women.<sup>16</sup> Anatomists of this period did not fully challenge the views of women contained in the Galenic corpus, nor did they formulate fundamentally new views of sex differences.

Andreas Vesalius, widely recognized as the founder of modern anatomy, typifies this meshing of old and new attitudes.<sup>17</sup> For Vesalius, sex differences were only skin deep. Vesalius did not believe that sex differences derived from the humors (as had the ancients); nor did he believe that sex differences penetrated the skeleton (as would the moderns). In the *Epitome* of his great work on the fabric of the human body, Vesalius drew a male and female nude where he pointed out differences in the curves and lines of the two bodies and the two sets of reproductive organs (figs. 1 and 2).<sup>18</sup> To accompany his male and female nudes, Vesalius drew a single skeleton that he labeled a “human” skeleton (fig. 3). By believing that one “human” skeleton gives shape to both the male and the female body, Vesalius did not sexualize the bones of the “human” body. Though he made clear in textual notes that the skeleton was drawn from a seventeen- or eighteen-year-old male, Vesalius did not give a sex to his skeleton.

In Vesalius’ view, sex differences between male and female bodies are limited to differences in the outline of the body and the organs of reproduction. In his *Epitome*, Vesalius drew two manikins or paper dolls that were to be cut out by medical students and “dressed” with their organs; this was an exercise designed to teach medical students the position and relation of the various viscera. One manikin represented a female form and displayed the system of nerves; the other represented a male figure and showed the muscles. Vesalius presented both the male and female manikins in order to demonstrate the position and nature of the organs of generation. Apart from the reproductive organs, Vesalius considered all other organs interchangeable between the two figures. In his instructions for construction of the manikins Vesalius made this explicit: “The sheet [of organs to be attached to the male manikin] differs in no way from that containing the figures to be joined to the last page [the drawing of the female manikin] except for the organs of generation.”<sup>19</sup>

Though Vesalius rejected the ancient view that sex differences pervade the body, he did accept ancient views on the inferior nature of women’s reproductive organs. In his *De corporis humani fabrica*, Vesalius adopted Galen’s view of female sex organs as analogous to men’s but imperfect because they were inverted and



internal.<sup>20</sup> Vesalius not only accepted Galen's view of women's reproductive organs, he also provided the best visual rendering of Galen's conception (see p. 10, fig. 4).

The relative indifference of early modern anatomists to the question of sex differences did not derive from an ignorance of the female body. A look at anatomical illustrations from the fourteenth through the seventeenth centuries shows that women were, in fact, dissected. The Montpellier Codex of 1363 includes an illustration showing the dissection of a female body.<sup>21</sup> A statute enacted in France in 1560 required midwives to attend the dissection of female bodies so that they would know enough about female anatomy to be able to testify in abortion cases.<sup>22</sup> The frontispiece of Vesalius' 1543 *De corporis humani fabrica* depicts a public dissection in a theater teeming with men, dogs, and one lone monkey; on the table, under the knife, is a woman.<sup>23</sup> Vesalius based his drawings of female organs of reproduction on dissections of at least nine female bodies. Vesalius did not procure these bodies without difficulties, however; at least one was stolen. Hearing that a woman who had been the mistress to a certain monk had died, Vesalius and his helpers snatched her body from the tomb.<sup>24</sup> This remained a common practice for quite some time: William Cheselden, an English physician, reported in 1713 that he procured female bodies for dissection from "executed bodies and . . . a common whore that died suddenly."<sup>25</sup>

The indifference of early modern anatomists to the question of sex differences did not, however, lead them to "desexualize" the bodies they studied. On the contrary, until the nineteenth century the sex of the bodies used for dissection was explicitly portrayed either by genitalia or breasts, or by a wisp of hair falling over the shoulder in the case of a woman or a prominent beard in the case of a man.<sup>26</sup> The Dutch anatomist Godfried Bidloo produced a set of plates in the late seventeenth century unique for their explicit portrayal of the sex of the body dissected. Bidloo's "true to life" drawings always portrayed the sex of the cadavers being dissected. Male and female bodies were used indiscriminately to illustrate various parts of the body. In William Cowper's 1697 publication of Bidloo's plates, a woman model appears in a series of plates describing the muscles in the upper half of the human body (fig. 4).<sup>27</sup>

Bidloo and Cowper, like Vesalius, focused on two major differences between men and women: external bodily form and reproductive organs. In 1697, Cowper reproduced the Bidloo drawings of the Apollo-Pithius and Medici Venus, in order to portray differences in symmetry and proportion between man and woman (figs. 5 and 6). Cowper found that

most remarkably the shoulders of the woman are narrower; the man having Two Length or Faces in the Breadth of his Shoulders, and one and a Half in his Hips; whereas Woman, on the contrary, has but one Face and a Half in her Shoulders, and Two in her Hips. Secondly, the Clavicule or Channel-bones, and Muscles in general do not appear in Women

as in Men; whence it is, the out Line of the one, as Painters call it, differs very much from the other.<sup>28</sup>

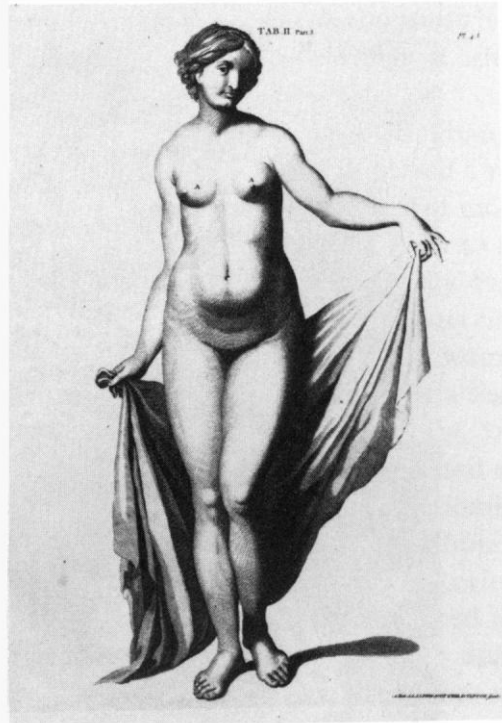
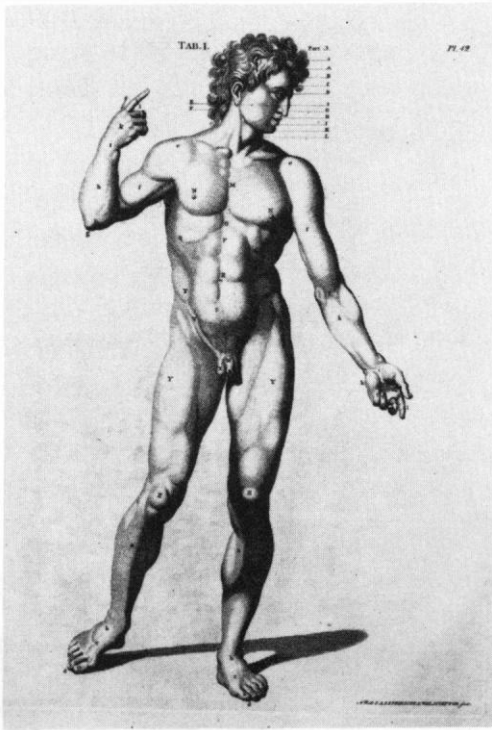
These three Bidloo figures were drawn not from life but from classical statues; Bidloo claimed these figures exhibited “the most beautiful proportions of a man and woman as they were fixed by the ancients.” Venus’ distinctive parts (labeled A and B) are the breasts and genitalia. Cowper did not attribute differences in the male and female outline to any deep structural differences between men and women “either in their whole frame, or in the intimate Structure of their Parts.” Rather, the differences in appearance between men and women emanate from “the great quantity of Fat placed under the skins of women.”<sup>29</sup>

It is true of course that throughout the sixteenth and seventeenth centuries anatomists in the vanguard of science—Vesalius, Bidloo, Cowper—made passing remarks about differences in male and female bodies apart from differences in exterior form or sex organs. Cowper, for example, noted that the skin is softer in women and the thyroid gland is larger. Yet few attempts were made to delineate sex differences throughout the body. Drawings of skeletons, although most often done from male bodies, were thought to represent the bones of the human body.



FIGURE 4 (*left*). William Cowper, muscles of the back, in *The Anatomy of Humane Bodies* (1697; London, 1737), plate 27.

FIGURES 5 and 6 (*opposite*). Cowper, male and female nudes, in Andrew Bell, *Anatomia Britannica: A System of Anatomy* (Edinburgh, 1798), plates 42, 43.



## Sex Is More Than Skin Deep

*Sexual differences are not restricted merely to the organs of reproduction but penetrate the entire organism. The entire life takes on a feminine or masculine character.*

—J. J. Sachs<sup>30</sup>

A fundamental shift in the definition of sex differences emerged in the course of the eighteenth and early nineteenth century. Beginning in the 1750s, a body of literature appeared in France and Germany calling for a finer delineation of sex differences. In 1750, Edmond Thomas Moreau published a slim book in Paris entitled *A Medical Question: Whether Apart from Genitalia There Is a Difference Between the Sexes?*<sup>31</sup> In 1775, the French physician Pierre Roussel reproached his colleagues for considering woman similar to man except in sexual organs. “The essence of sex,” he explained, “is not confined to a single organ but extends, through more or less perceptible nuances, into every part.”<sup>32</sup> In 1788, German anatomist Jakob Ackermann stated that the present definition of sex differences was inadequate. The great physiologists, he complained, have neglected the description of the female body. “Indeed, sex differences,” he emphasized, “have always been observed, but their description has been arbitrary.”<sup>33</sup> In his two-hundred-page book on sex differences in bones, hair, mouths, eyes, voices, blood vessels, sweat, and brains, Ackermann called for a “more essential” descrip-

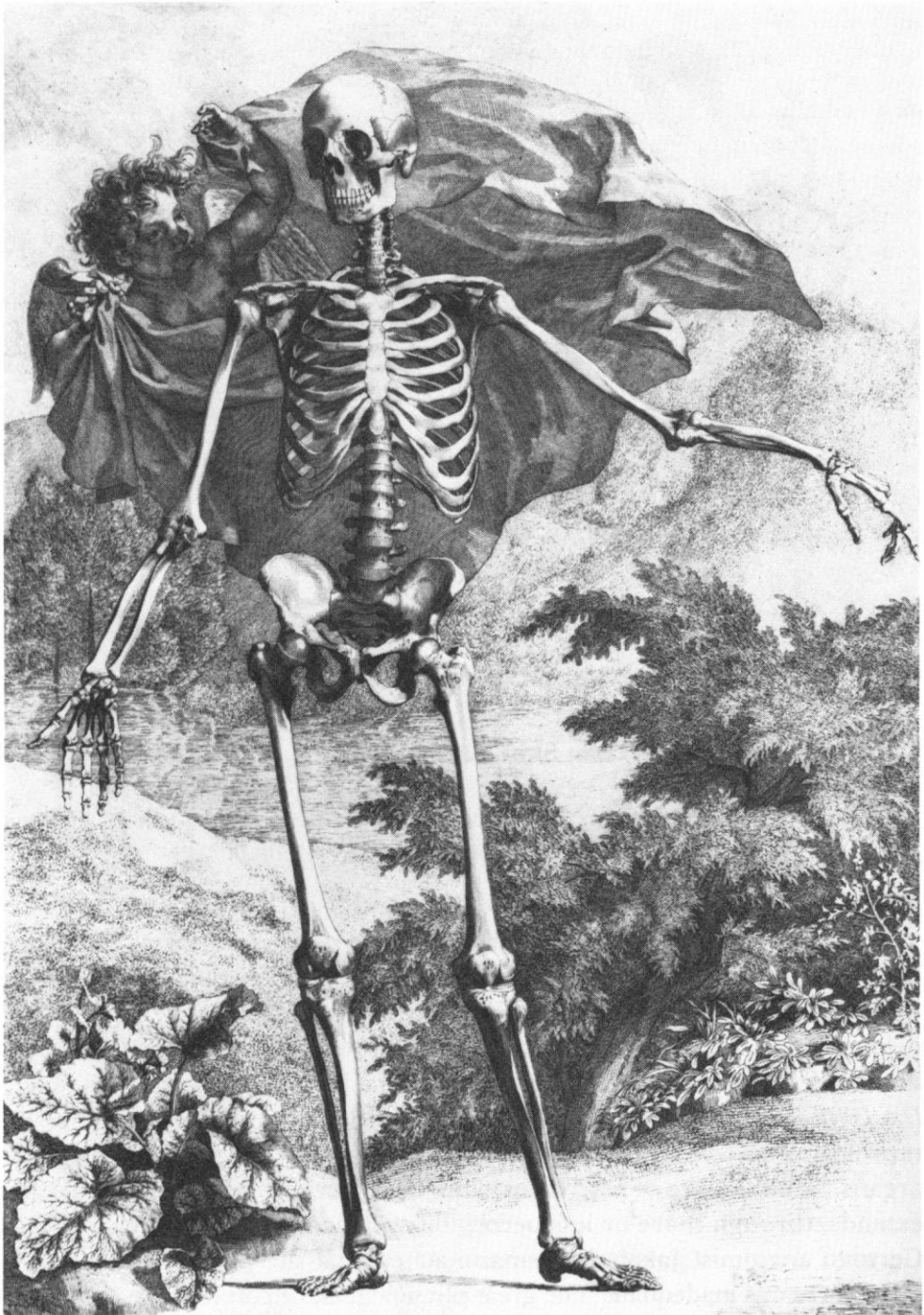


FIGURE 7. Bernhard Albinus, bones of the human body, in *Tabulae sceleti et musculorum corporis humani* (Leyden, 1747), plate 1.

tion of sex differences and encouraged anatomists to research the most basic parts of the body to discover “the essential sex difference from which all others flow.”<sup>34</sup>

These anatomists’ interest in the female body was shaped, in part, by changes in the broader culture. Mercantilist interests in population growth played a role in the rise of the eighteenth-century ideal of motherhood.<sup>35</sup> The ideal of motherhood, in turn, profoundly changed medical views of the uterus.<sup>36</sup> Prior to the eighteenth century, the uterus was much maligned in natural philosophy. Plato thought it an animal with independent powers of movement.<sup>37</sup> Democritus cited the uterus as the cause of a thousand sicknesses. Baglio thought that women suffer each sickness twice, because of the uterus.<sup>38</sup> Galen and even (for a time) Vesalius reported that horns bud from the sides of the womb (see p. 8, fig. 3).<sup>39</sup> As the ideal of motherhood gained acceptance, however, anatomists rejected the view that women are “imperfect men” or monsters of nature.<sup>40</sup> Rather anatomists such as Jacques-Louis Moreau found women uniquely equipped to contribute to the propagation of the human race—even more so, in fact, than men.<sup>41</sup> Reviewing the history of women’s medicine in 1829, Carl Ludwig Klose rejected the comparison of men’s and women’s sex organs that had, he maintained, occupied natural scientists from Aristotle to Albrecht von Haller. Klose argued that the uterus, woman’s most important sex organ, has no analogue in man; hence the comparison with men’s organs is worthless.<sup>42</sup>

The eighteenth-century ideal of motherhood encouraged doctors to view women as sexually perfect. Yet, if the uterus was to be viewed as perfect, did this mean that women were physiologically perfect beings? Certainly this hypothesis left the door open for those who, like Poullain de la Barre or Astell in the seventeenth century, argued that the physically perfect woman could be considered the social equal of man. Yet the debate did not end here. If the uterus was to be considered a unique and perfect organ in its own right, perhaps there were other sex differences that revealed a natural inferiority of women to men.

It was as part of this broader investigation of sex differences that drawings of the first female skeletons appeared in England, France, and Germany between 1730 and 1790. The skeleton, as the hardest part of the body, was thought to provide a “ground plan” upon which muscles, veins, and nerves were to be drawn. In 1749, anatomist Bernhard Siegfried Albinus wrote:

I must pitch upon something . . . as the base or foundation to build my figures upon. And this is the skeleton: which being part of the body, and lying below the muscles, the figures of it ought first to be taken off as certain and natural direction for the others.<sup>43</sup>

If sex differences could be found in the skeleton, then sexual identity would no longer be a matter of sex organs appended to a neutral human body, as Vesalius had thought, but would penetrate every muscle, vein, and organ attached to and molded by the skeleton.

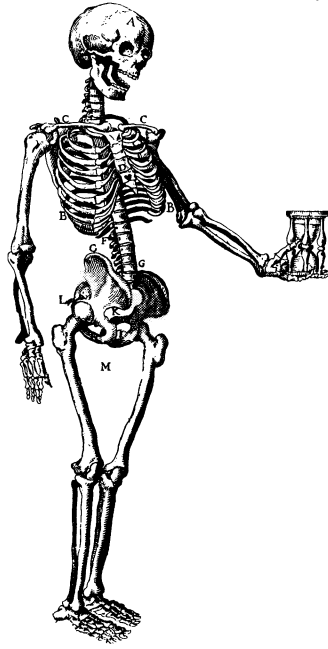


FIGURE 8. Gaspard Bauhin,  
“Skeleton of the Bones and  
Gristles of a Woman,” in  
*Theatrum anatomicum*  
(Frankfurt, 1605), table 4.

In 1734, Bernhard Albinus produced the definitive illustration of the human skeleton, which remained unsurpassed for at least three quarters of a century (fig. 7).<sup>44</sup> The work was laborious, taking three months to complete. Albinus drew the skeleton from three different perspectives—front, side, and back—“not free hand as is customary, but from actual measure . . . and by collecting data from one body after another, and making a composite according to rules so that actual truth will be displayed. . . . All [drawings] have been measured, brought down to scale . . . as architects do.”<sup>45</sup> Having produced the most perfect possible drawing of the human skeleton (which Albinus made clear was drawn from a male body), Albinus lamented, “We lack a female skeleton.”<sup>46</sup>

Albinus had good grounds for complaining that the study of female anatomy was inadequate before 1740. The standard studies of the human skeleton by Vesalius and Bidloo had been of the male. Only one “crude” illustration of a female skeleton published by Gaspard Bauhin in 1605 had appeared before the eighteenth century (fig. 8).<sup>47</sup> Within fifty years of Albinus’ plea, however, basic anatomical descriptions of the female body had been established. One of the first drawings of a female skeleton appeared in England in 1733 (William Cheselden). Two appeared in France: one in 1753 (Pierre Tarin),<sup>48</sup> and another in 1759 (d’Arconville). One appeared in Germany in 1796 (Soemmerring). Even though

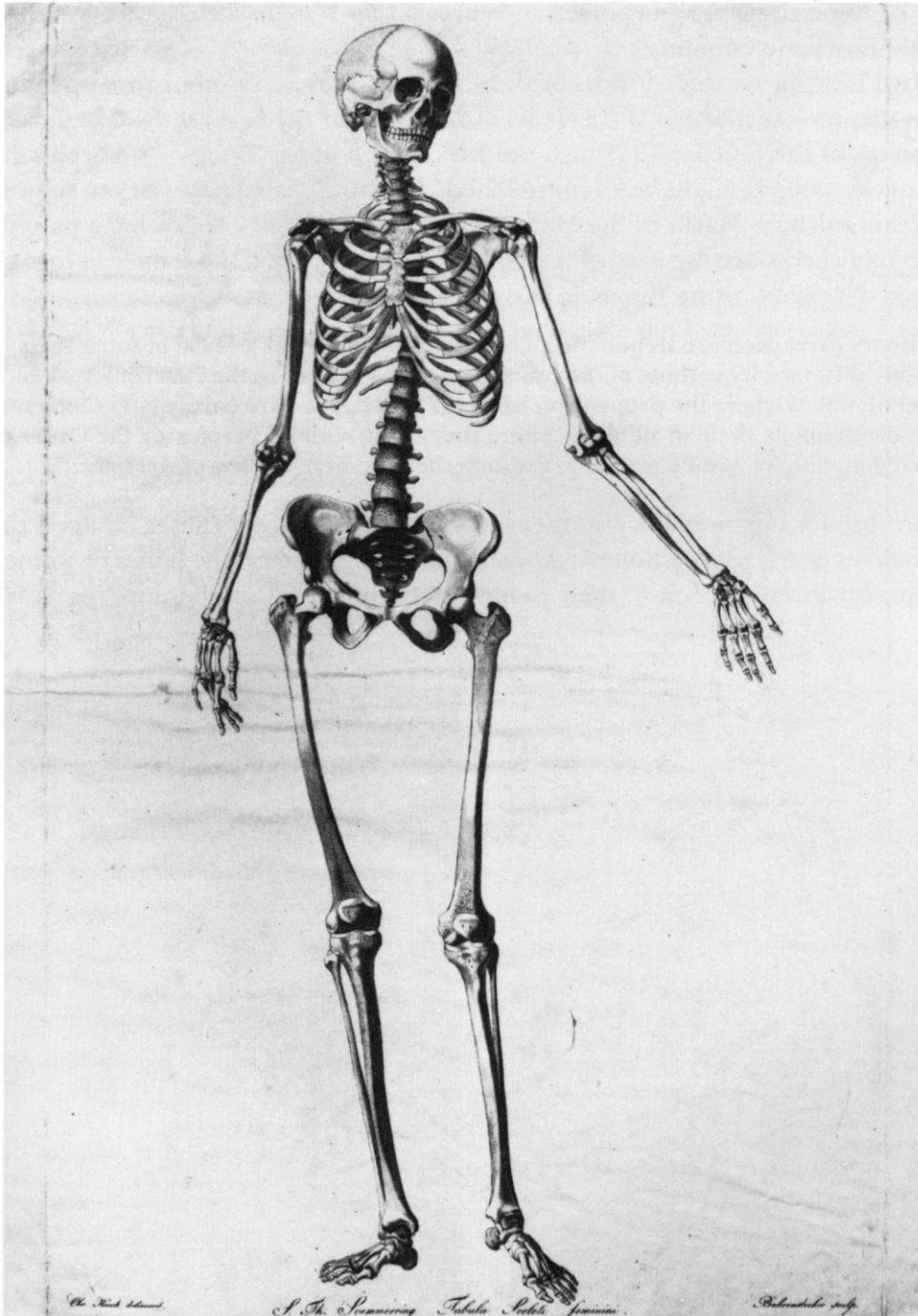


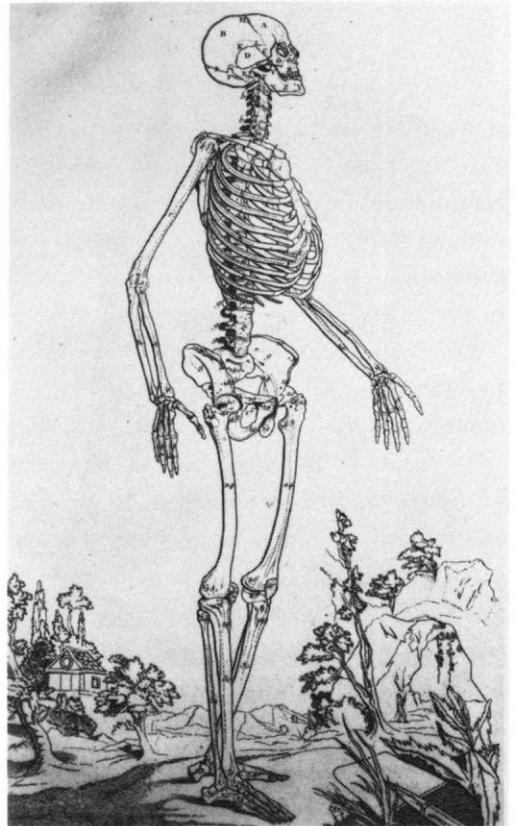
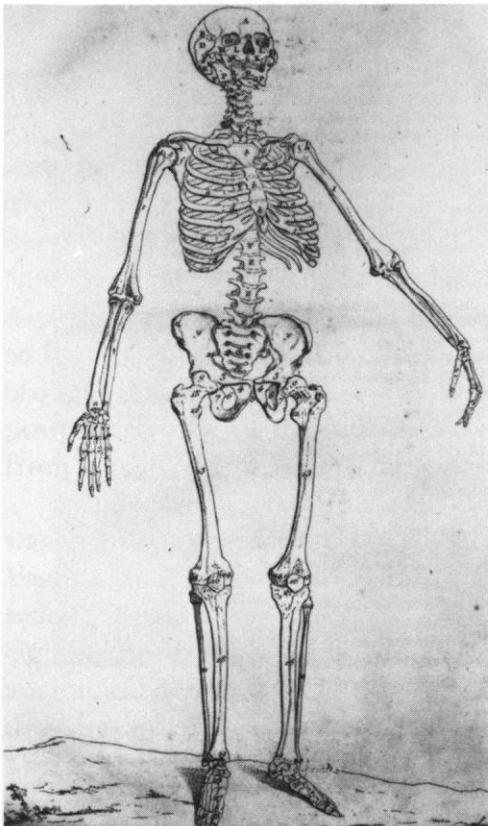
FIGURE 9. Samuel Thomas von Soemmerring, female skeleton, in *Tabula sceleti feminini* (Frankfurt, 1796).

each of these drawings purported to represent *the* female skeleton, they varied greatly from one another.

In 1726, Alexander Monro, professor of anatomy in Edinburgh, appended to his text on *The Anatomy of the Humane Bones* one of the earliest descriptions of the bones of the female. To “finish the Description of the Bones . . . [so] that no part of this Subject might be left untouched,” he wrote, “it [is] necessary to subjoin the distinguishing Marks of the Male and Female Sceletons.” Following a pattern well established since the time of Aristotle, Monro described the female as incomplete and deviant, using the male body as a standard of measure:

The Bones of Women are frequently incomplete, and always of a Make in some Parts of the Body different from those of the robust Male, which agree to the Description already delivered, unless where the proper Specialities of the Female were particularly remarked, which could not be done in all Places where they occur, without perplexing the Order of this Treatise: Therefore I chose rather to sum them up here by Way of *Appendix*.<sup>49</sup>

Monro used a functionalist argument to explain how three “causes” shaped the “specialities of the female Bones”: A weak constitution makes “the bones of women . . . smaller in Proportion to their Length than those of Men, because the Force

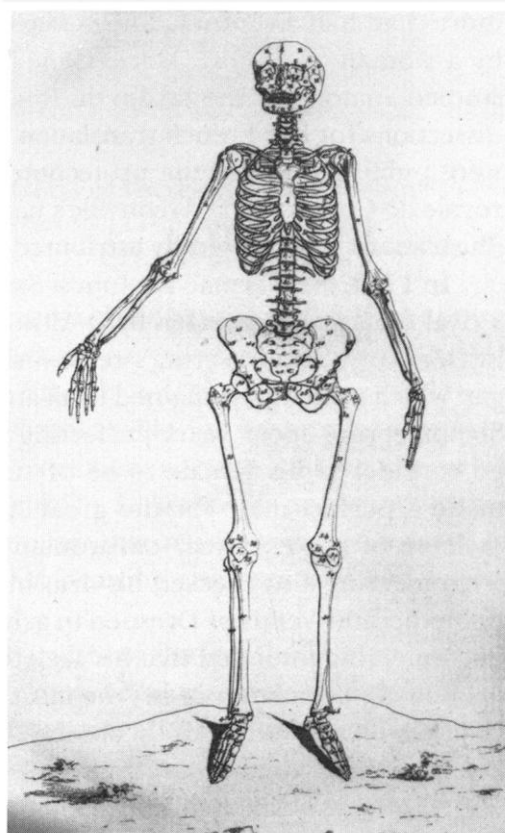
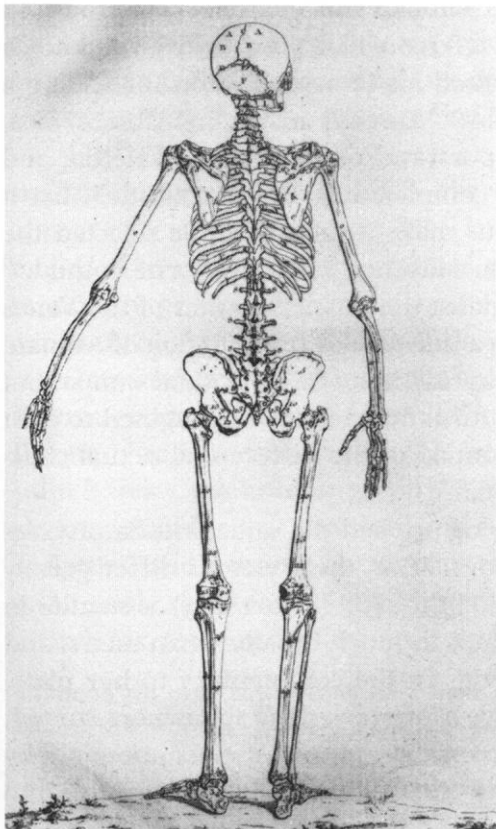




of their Muscles is not so great." A sedentary life makes "their *Clavicles* less crooked, because their Arms have been less forcibly pulled forwards, which indeed in our *European Women*, especially those of Distinction, is more hindred by their Garb." And a frame proper for their procreative functions makes women's pelvic area larger and stronger "to afford Lodging and Nourishment to their tender *Fetus's*." In particular, Monro found:

The Os sacrum is more turned outwards for enlarging the Pelvis. The Os Coccygis is more moveable, and less bended forwards, to facilitate the Birth. . . . The conjoined Surfaces of the Ossa pubis, and of the Offa innominata and sacrum are less, that with the straighter Os sacrum, a larger Passage might be left for the Exclusion of the Child in Birth.<sup>50</sup>

FIGURE 13 (*right*). [d'Arconville], "Female Skeleton, Drawn from Front View Only, Studied for Its Deviation from the Male Skeleton," in *ibid.*, plate 4.



FIGURES 10, 11, and 12 (*opposite and left*). [Marie-Geneviève-Charlotte Thiroux d'Arconville], "Male Skeleton Studied from Front, Side, and Back," from Jean-J. Sue, *Traité d'ostéologie* (Paris, 1759), plates 1–3.

Monro provided one of the first descriptions of the bones of the female body in his four-page appendix, but he did not supplement his description with any illustrations.

One of the earliest drawings of a female skeleton was done by William Cheselden in 1733. This was a new interest of his in 1733; the 1713 edition of his *Anatomy* did not include an illustration of a female skeleton. Cheselden's matched set of male and female skeletons followed the Bidloo tradition of comparing idealized male and female figures drawn from art. His female skeleton is drawn in the "same proportion as the Venus of Medicis"; his male skeleton is drawn in the same proportion and attitude as the Belvedere Apollo.<sup>51</sup>

Text and image came together in the French rendering of a female skeleton that made its debut in 1759, capturing the imagination of medical doctors for more than half a century. The skeleton appears to be one of the very few drawn by a woman anatomist. Marie-Geneviève-Charlotte Thiroux d'Arconville, who studied anatomy at the Jardin du Roi, directed the drawing of illustrations from dissections for her French translation of Monro's *Anatomy*.<sup>52</sup> D'Arconville's plates were published under the protection of Jean-J. Sue, member of the Académie royale de Chirurgie. D'Arconville's name does not appear in the volume, and the illustrations were generally attributed to Sue.<sup>53</sup>

In 1796, the German anatomist Samuel Thomas von Soemmerring produced a rival female skeleton (fig. 9).<sup>54</sup> Although d'Arconville's (Sue's) work was known in Germany, Soemmerring's reviewers praised his female skeleton for "filling a gap which until now remained in all anatomy."<sup>55</sup> Directly answering Albinus' plea, Soemmerring spent years perfecting his portrayal of the female skeleton, and he considered his female to be of such "completeness and exactitude" that it made a perfect mate for the great Albinus male. As a model, he selected the skeleton of a twenty-year-old woman from Mayence who had borne a child.<sup>56</sup> Soemmerring also checked his drawing against the classical statues of the Venus di Medici and Venus of Dresden to achieve a universal representation of woman. Soemmerring intended that his skeleton represent not an individual woman but (as Ludwig Choulant put it) "the most beautiful norm as it was imagined to exist in life, with all the carefully observed minutiae of the differential sexual characters of the entire bony structure of woman."<sup>57</sup>

Although d'Arconville and Soemmerring applied the same criteria of exactitude in drawing the female skeleton from nature, the skeletons differ greatly from one another. D'Arconville/Sue depicted the skull (incorrectly) as smaller in proportion to the body than a man's, the hips as much broader than men's, and the ribs as extremely narrow and confining. In the commentary to her plate, d'Arconville described the chest of the female as narrower, the spine more curved, and the haunches and pelvis larger in women than in men.<sup>58</sup> Soemmerring, by contrast, portrayed his female skeleton with the ribs as smaller in proportion to

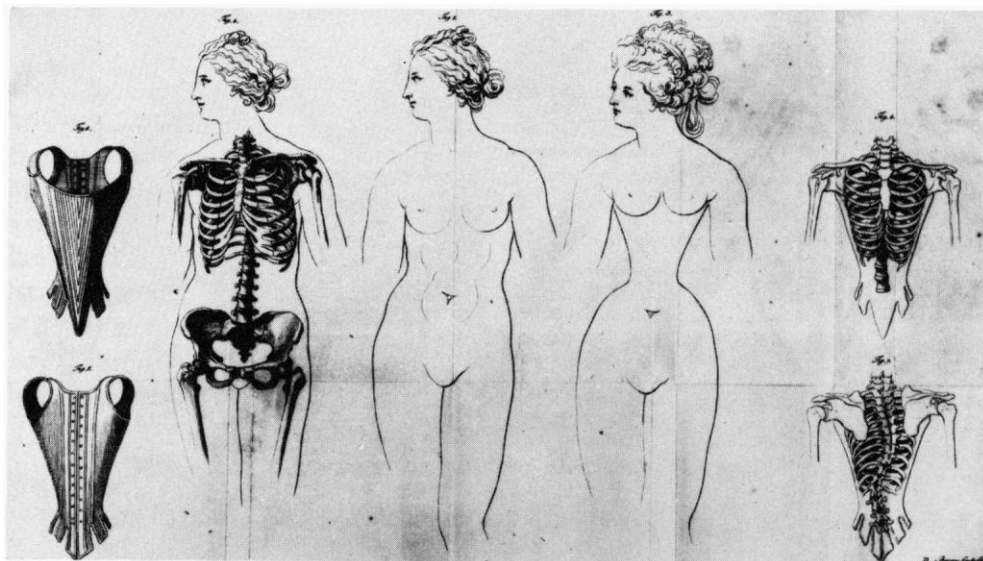


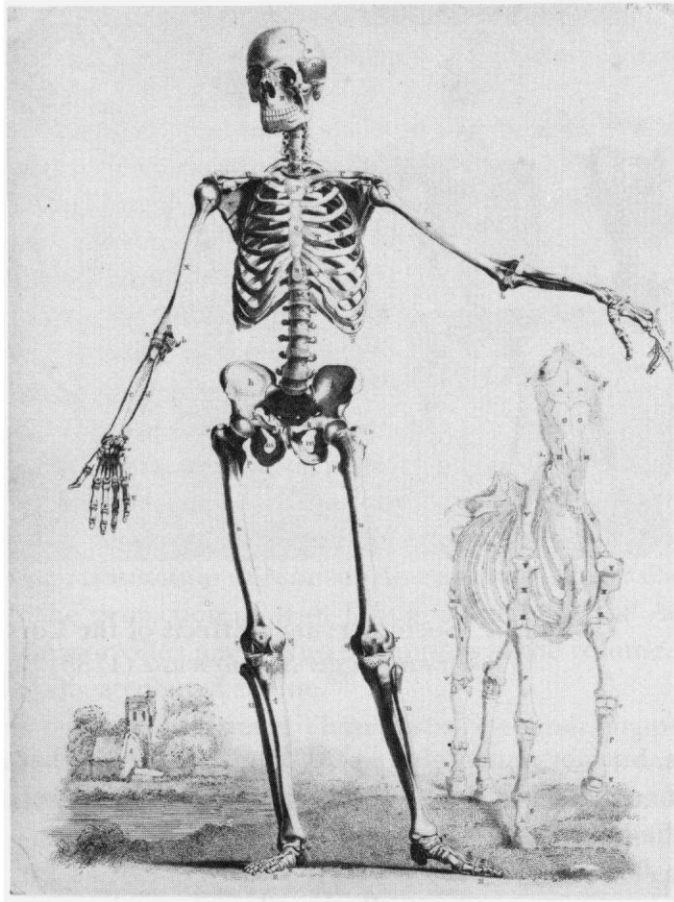
FIGURE 14. Soemmerring, “Effects of the Corset,” in *Über die Wirkungen der Schnürbrüste* (1785; Berlin, 1793).

the hips, but not remarkably so. Ackermann argued that women’s hips appear larger than men’s because their upper bodies are narrower, which by comparison makes the hips seem to protrude on both sides.

The d’Arconville skeleton is, in fact, remarkable for its proportions. The skull is drawn extremely small, the ribs extremely narrow, making the pelvis appear excessively large (figs. 10, 11, 12, and 13). D’Arconville apparently either intended to emphasize the cultural perception that narrow ribs are a mark of femininity, or she chose as the model for her drawing a woman who had worn a corset throughout her life (fig. 14).

Great debate erupted over the exact character of the female skeleton. Despite its exaggerations, the d’Arconville/Sue skeleton became the favored drawing in Britain.<sup>59</sup> Soemmerring’s skeleton, by contrast, was attacked for its “inaccuracies.” John Barclay, the Edinburgh physician, wrote, “although it be more graceful and elegant [than the Sue skeleton] and suggested by men of eminence in modeling, sculpture, and painting, it contributes nothing to the comparison [between male and female skeletons] which is intended.”<sup>60</sup> Soemmerring was attacked, in particular, for showing the incorrect proportion of the ribs to the hips:

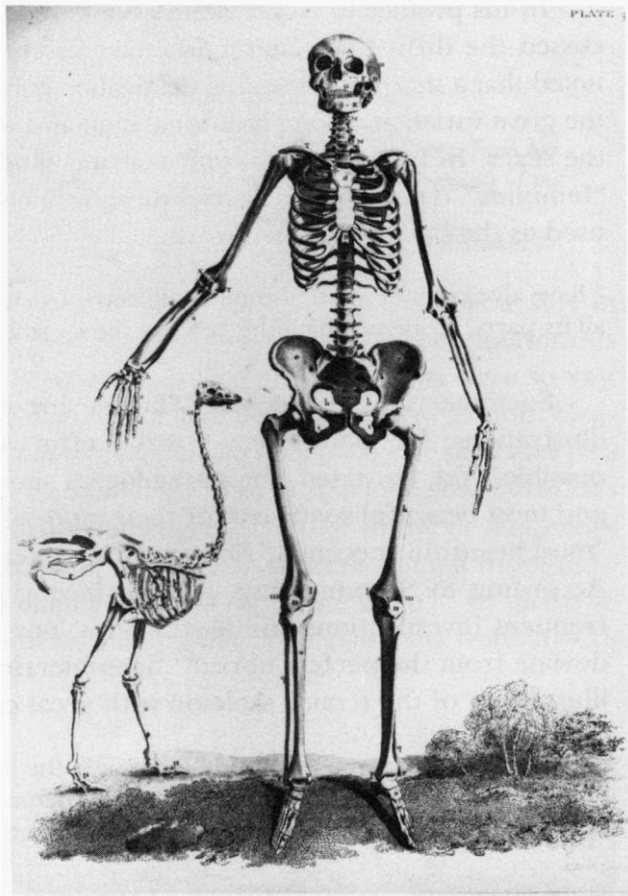
Women’s rib cage is much smaller than that shown by Soemmerring, because it is well known that women’s restricted life style requires that they breathe less vigorously. . . . The pelvis, and it is here alone that we perceive the strongly-marked and peculiar characters of the female skeleton, is shown by Soemmerring as improperly small.<sup>61</sup>



Anatomists concluded that Soemmerring was an artist, but no anatomist. The French doctor Jacques-Louis Moreau, however, found Soemmerring's portrayal of the female skeleton the most sublime and, in his two-volume work on the natural history of women, modeled his skeleton on Soemmerring's.<sup>62</sup>

What are we to make of this controversy? Did even the most exact illustrations of the female skeleton represent the female body accurately? The ideal of anatomical representation in the eighteenth century was exactitude. In his "Account of the Work," Albinus recounted how he prepared his male skeleton carefully with water and vinegar so that it would not lose moisture and change appearance over the three months of drawings. Though anatomists attempted to represent nature with precision, they also intended to represent the body in its most beautiful and universal form. Albinus quite consciously strived to capture the details not of a particular body but of a universal and ideal type. "I am of the opinion," he stated, "that what Nature, the arch workman . . . has fashioned must be sifted

FIGURES 15 (*opposite*) and 16 (*right*). John Barclay, “Male Skeleton Compared to the Horse” and “Female Skeleton Compared to the Ostrich,” in *The Anatomy of the Bones of the Human Body* (Edinburgh, 1829), plate 1.



with care and judgment, and that from the endless variety of Nature the best elements must be selected.”<sup>63</sup>

The supposedly “universal” representations of the human body in eighteenth-century anatomical illustrations were, in fact, laden with cultural values. The two sets of male and female skeletons shown in figures 7 and 9, 10–12 and 13 represent not merely the bones of the male and the female body; they also serve to produce and reproduce contemporary ideals of masculinity and femininity. For his illustrations, Albinus collected data from “one body after another.” He then selected one “perfect” skeleton to serve as his model. Albinus also revealed the criteria by which he “sifted” nature in the drawing of his male skeleton:

As skeletons differ from one another, not only as to the age, sex, stature and perfection of the bones, but likewise in the marks of strength, beauty and make of the whole; I made choice of one that might discover signs both of strength and agility: the whole of it elegant, and at the same time not too delicate; so as neither to shew a juvenile or feminine roundness and slenderness, nor on the contrary an unpolished roughness and clumsiness.<sup>64</sup>

In his preface to Ackermann's book on sex differences, Joseph Wenzel discussed the difficulties anatomists have in choosing models for their work. He noted that a sharp physiological delineation between the sexes is impossible because the great variation among individual men and women produces continuity between the sexes. In fact, he wrote, one can find skulls, brains, and breast bones of the "feminine" type in men. Wenzel then defined a standard of femininity that he used as the basis of his own work:

I have always observed that the female body which is the most beautiful and womanly in all its parts, is one in which the pelvis is the largest in relation to the rest of the body.<sup>65</sup>

Soemmerring strived, like Albinus, for exactitude and universality in his illustrations. He made every possible effort to "approach nature as nearly as possible." Yet, he stated, the physiologists should always select the most perfect and most beautiful specimen for their models.<sup>66</sup> In identifying and selecting the "most beautiful specimen," Soemmerring intended to establish norms of beauty. According to Soemmerring, without having established a norm by means of frequent investigations and abstractions, one is not able to decide which cases deviate from the perfect norm.<sup>67</sup> Soemmerring chose the "ideal" model for his illustration of the female skeleton with great care:

Above all I was anxious to provide for myself the body of a woman that was suitable not only because of her youth and aptitude for procreation, but also because of the harmony of her limbs, beauty, and elegance, of the kind that the ancients used to ascribe to Venus.<sup>68</sup>

In their illustrations of the female body, anatomists followed the example of those painters who "draw a handsome face, and if there happens to be any blemish in it, they mend it in the picture."<sup>69</sup> Anatomists of the eighteenth century "mended" nature to fit emerging ideals of masculinity and femininity.

In the nineteenth century, the bones of the human body took on more overtones of masculinity and femininity. In 1829, John Barclay, the Edinburgh anatomist, brought together the finest illustrations from the European tradition for the sake of comparison. As the finest example of a male skeleton Barclay chose the Albinus drawing. Then looking to the animal kingdom, Barclay sought an animal skeleton, one that would highlight the distinctive features of the male skeleton. The animal he found as most appropriate for comparison to the male skeleton was the horse, remarkable for its marks of strength and agility (fig. 15). As the finest representation of the female skeleton Barclay chose the delicate d'Arconville/Sue rendition. This he compared to an animal noted for its large pelvis and long, narrow neck—the ostrich (fig. 16).

**Man (White and European)  
the Measure of All Things: Women  
as Children and Primitives**

*In approaching puberty, woman seems to distance herself less than man from her primitive constitution. Delicate and tender, she always conserves something of the temperament characteristic of children.*

—Pierre Roussel<sup>70</sup>

The flood of medical literature on sex differences did not subside in the course of the nineteenth century. As the century progressed, some anatomists came to believe that differences between male and female bodies were so vast that women's development had been arrested at a lower stage of evolution. Measurement of the distinguishing characteristics of the skeleton—the skull and pelvis—led some anatomists to conclude that white women ranked below European men in the scales of both ontogeny and phylogeny. Neither in the development of the species nor in the development of the individual were women thought to attain the full “human” maturity exemplified by the white male.<sup>71</sup> In terms of both physical and social development, these anatomists classified women with children and “primitive” peoples.

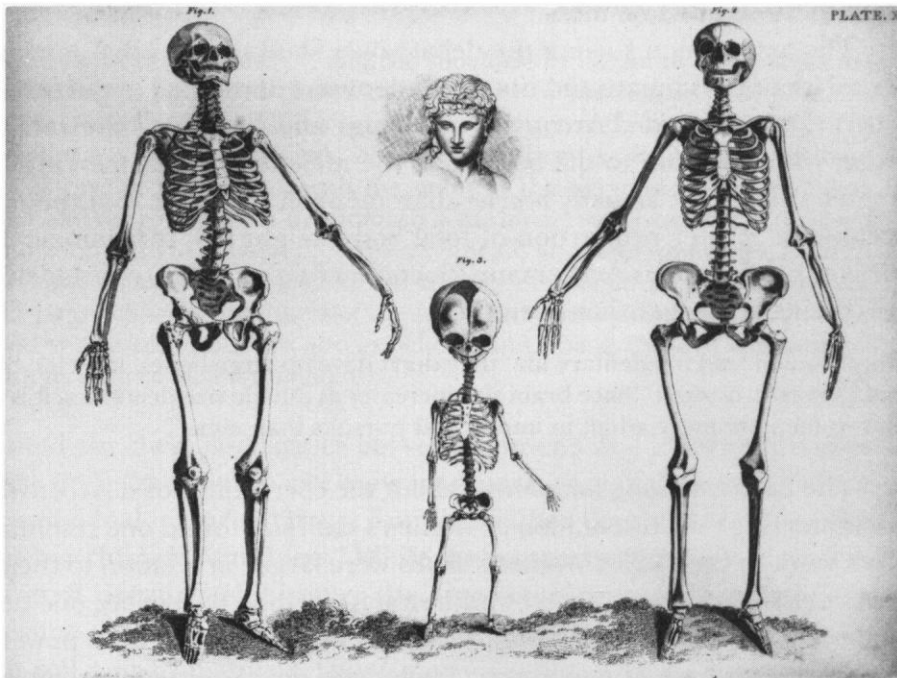


FIGURE 17. Barclay, “Skeleton Family,” in *ibid.*, plate 32.

In the course of the late eighteenth and nineteenth centuries, categories of sex and race increasingly came to define standards of social worth. At the same time, these standards came to reflect the structure of the scientific community. Those who possessed the tools of science took themselves as the standard of excellence. In the absence of women, the largely male scientific community studied women using male anatomy as the norm against which to measure female anatomy. In similar fashion, in the absence of blacks, the white scientific community studied blacks using the white male as the standard of excellence.<sup>72</sup> Excluded from the practice of science, women and blacks (not to mention other groups) had little opportunity to dispute the findings of scientists.

The illustrations of female skeletons by d'Arconville/Sue and Soemmerring sparked a protracted debate about the size of the female skull. The question of intelligence was becoming more and more important; "natural reason" was increasingly conceived to be a prerequisite for many political rights and social opportunities.<sup>73</sup> In this context, the skull became an important focus for providing an objective measure of intelligence. Hegel, following F. J. Gall, held that the brain "molded the skull—here pressing it out around, there widening or flattening it."<sup>74</sup> Craniologists analyzed the size and shape of the skulls of men and women, whites and blacks, hoping to answer the much debated question: whether or not the intellectual capacities of women and "primitive peoples" were equivalent to those of white men.

The assumption fueling the debate over skull size was that intelligence, like sexual identity, is innate and not dependent on educational opportunities. Soemmerring repudiated d'Arconville's findings and portrayed the female skull as larger in proportion to the body than the male skull. Soemmerring found that women's skulls are actually *heavier* than men's in the sense that the female skull occupies a greater proportion of total body weight (1/6 for women; 1/8 or 1/10 for men).<sup>75</sup> From this Ackermann (Soemmerring's student) concluded that women's brains are larger than men's:

Since women lead a sedentary life, they don't develop large bones, muscles, blood vessels and nerves as do men. Since brain size increases as muscle size decreases, it is no surprise that women are more adept in intellectual pursuits than men.<sup>76</sup>

The debate among anatomists about the correctness of d'Arconville/Sue's or Soemmerring's representation of women's skull size found one resolution in Barclay's work in the 1820s. Women's skulls were larger in relation to their body size than men's—but then, so were children's. According to Barclay, one needn't conclude that women's larger skulls are loaded with heavy and high-powered brains. Rather than a mark of intelligence, large skulls signal women's incomplete growth. In 1829 Barclay, using d'Arconville/Sue's plates, presented a skeleton family (fig. 17). Although anatomical drawings of children and fetuses had been published



since the early eighteenth century, skeletons of man, woman, and child were brought together for the first time by Barclay “for sake of comparison.” In his commentary, Barclay upbraided Soemmerring for drawing comparisons between only the male and female skeleton; Barclay introduced the child’s skeleton “to shew that many of those characteristics, which he [Soemmerring] has described as peculiar to the female, are more obviously discernible in the fetal skeleton.”<sup>77</sup> Barclay pointed out that along with equivalent skull sizes, both women and children have the fissure separating the frontal skull bone; both have smaller bones compared to men; the rib cage, jaw shape, and feet size of women are more similar to those of children than to men. Woman’s one distinguishing characteristic, Barclay argued, is her pelvis:

It is there [in the pelvis] that we cease to trace the analogies between its [the female skeleton’s] proportions and those of the foetus: or in other words, it is there that, in deviating from those characters which at one time were common to both [male and female], we regularly find it [the pelvis] deviating farther than that of the male—the pelvis of the foetus being always proportionally the smallest of the three, and that of the female proportionally the largest.

By mid-century, the image of the childlike woman had become common. In *Das Weib und das Kind* (1847) the German doctor E. W. Posner gave one of the clearest statements of the physical similarities between women and children:

Women’s limbs are short and delicate . . . and the shortness of the limbs determines the smaller size of the female body and proves the similarity of the female body with the child’s body. . . . As is true in the child, the woman has a larger and rounder abdomen in relation to her breast. . . . The entire trunk, which in man forms a pyramid with the base turned upward, is reversed in woman with the point of the pyramid at the shoulders which are smaller and narrower, while the stomach is the broad base from which the even broader hips and strong thighs proceed. . . . Women’s heads also tend toward the childish type. The finer bone structure, the tender, less sharply developed facial features, the smaller nose, the larger childish roundness of the face clearly show this similarity. . . . The nerves and blood vessels of women are also as delicate and fine as those of children . . . and the skin with its layer of rich fat is childish.<sup>78</sup>

Posner accounted for these similarities between women’s and children’s bodies by arguing that since “the female sex ends its growth earlier than men before reaching full individual maturity [at age fourteen rather than eighteen] . . . the woman retains her childish roundness.” While the comparison of women to children is not in itself negative (children in the nineteenth century also represent innocence, freshness, and youth), Posner’s explanation implied that women have failed to reach full human maturity. Like Charles Darwin, Posner assumed that there is one unified, natural hierarchy of physical, intellectual, and cultural development within which every category of human being has its place. Posner made

it clear that the European male body type was the norm of maturity against which women, blacks, and children were to be measured.

It should be noted that the comparison of women with children was by no means new to the nineteenth century. By drawing parallels between the anatomy of women and children, anatomists restated in the language of modern science an ancient prejudice against women. The ancients—Zenocrates, Galen, and Her-magoras—commonly held that a woman can never be more than a child.<sup>79</sup> Galen thought that both women and children suffered from cold and moist humors that accounted for their lack of self-control. Aristotle grouped women, children, and slaves together in the three states of *consilium*.<sup>80</sup> In the biblical tradition the man was the head of the household, since God gave Adam dominion over women and children. The supposed evidence emerging in the early nineteenth century that women were physiologically linked to children served to translate these traditional prejudices into the language of modern science. The physical image of the childlike woman also reflected certain aspects of European custom. In the late eighteenth century, middle-class wives were on average ten years younger than their husbands;<sup>81</sup> it is not surprising that middle-class women should have appeared “childish” in comparison to their husbands.

I want to mention again that it has not been my purpose here to minimize physical differences between men and women but rather to analyze the social and political circumstances surrounding the search for sex differences. While identifiable differences between the sexes do exist, they have often been exaggerated. It is important to remember what Wenzel stressed in 1789, namely that “individual members of each sex differ significantly from one another; one can find male bodies with a feminine build, just as one can find female bodies with a masculine build.”<sup>82</sup> Moreover, many physical differences among human beings are not absolute but relative to social conditions.<sup>83</sup> Eighteenth-century anatomists repeatedly pointed to the fact that women are shorter and smaller than men. Women’s smallness, they thought, was dependent on bone size, which provided an absolute index of women’s weakness and delicacy. As current studies show, however, the difference in average height between European men and women has decreased over the last century. Height is, in part, determined by nourishment. In many cultures, it is customary for the woman to eat what remains after the man has eaten, or to give the man the best portion.<sup>84</sup>

Even if we do away with the exaggerations that have plagued studies of sex differences in Western medicine, however, we cannot do away with the fact of difference. Yet it is unclear what difference difference makes. Why should a set of physical differences be used to underwrite a system of social inequality? Why has the argument that physical difference implies intellectual and moral difference been so persuasive to so many for so long?

## **“Social Inequality as Natural Law”**

*The laws of divine and natural order reveal the female sex to be incapable of cultivating knowledge, and this is especially true in the fields of natural sciences and medicine.*

—Theodor L. W. von Bischoff<sup>85</sup>

Why did the comparative anatomy of men and women become a research project for the medical community in the late eighteenth century?<sup>86</sup> I want to argue here that it was the attempt to define the position of women in bourgeois European society at large and in science in particular that spawned the first representations of the female skeleton. One powerful assumption underlying much of nineteenth-century social theory was that physical evidence—nature—provided a point of certainty from which social theory could depart. A look at how the findings of anatomists were used will illuminate the role that the study of anatomical sex differences played in underwriting the increasing polarization of gender roles in European society.<sup>87</sup>

The growth of democratic tendencies brought about a reshuffling of the social order. In the eighteenth century it was not yet clear what women's role in the new social order was to be. Certainly, throughout the seventeenth and eighteenth centuries there was a struggle between those advocating full social equality for women and those advocating the continued subordination of women.<sup>88</sup> Some philosophers, such as Rousseau, hoped to lay a solid foundation for the theory of natural rights by disentangling the natural from the social in human nature. In his *Emile*, Rousseau appealed to a hypothetical state of nature, and to the nature of the human body as defined by comparative anatomy in his search for the natural relation between the sexes.<sup>89</sup>

Rousseau's pedagogical writings opened the flood gates of modern prescriptive literature on the proper character and education of the sexes.<sup>90</sup> Rousseau abhorred the public influence he saw in French women and the stirrings of feminism in the French Revolution. He took on proponents of women's equality by arguing that woman is not man's equal but his complement. Rousseau was instrumental in initiating the view that the inherent physical, moral, and intellectual differences of women suited them for roles in society vastly different from those of men.<sup>91</sup> To Rousseau's mind, it was the purpose of natural philosophy to read in the book of nature “everything which suits the constitution of her [woman's] species and her sex in order to fulfill her place in the physical and moral order.”<sup>92</sup>

There were also those who opposed Rousseau's argument of women's different nature and argued instead for the social equality of women. Among French philosophes, Helvétius, d'Alembert, and Condorcet traced the inferior intellectual achievement of women to their inferior education.<sup>93</sup> This line of argument

was also promoted by Mary Wollstonecraft in England, Olympe de Gouges in France, and Theodor von Hippel in Germany, to name a few.<sup>94</sup> It was in the eighteenth century that debates about women's character were framed by the modern opposition of "nurture" versus "nature." Those who found women's weakness a matter of "nurture" envisioned social and educational reform as the brightest path toward social equality of the sexes. Those who traced women's weakness to women's "nature" assumed that "whatever is, is right."

Many, however, were to apply the new findings of anatomy to the "woman" question. In French medical camps in particular, the physical became tied to the moral in such a way that medical arguments from "nature" increasingly penetrated social theory. The *Encyclopédie* article of 1765 on the "skeleton" devoted half its text to a comparison of the male and female skeleton. In great detail the differences are laid out between the male and female skull, spine, clavicle, sternum, coccyx, and pelvis. The article ends with one prescriptive phrase: "All of these facts prove that the destiny of women is to have children and to nourish them."<sup>95</sup>

In 1775, the medical doctor Pierre Roussel expanded upon this message. He claimed that differences in the male and female skeleton were of great importance. "Nature," he wrote, "has revealed through that special form given to the bones of woman that the differentiation of the sexes holds not only for a few superficial differences, but is the result perhaps of as many differences as there are organs in the human body."<sup>96</sup> Spirit or mind were among the organs Roussel listed. To Roussel's mind, moral and intellectual qualities were as innate and as enduring as the bones of the body. Roussel argued against "writers" who insisted that differences between men and women resulted from custom, education, or climate.<sup>97</sup> It was, he believed, rather the unerring findings of medicine that provided a certain ground for ethics. Philosophy, he wrote, cannot determine the moral powers of human beings without taking into consideration the influence of the bodily organization.<sup>98</sup>

In Germany, Soemmerring also believed that gender differences were to be traced to "nature," not to "nurture." In his book on the comparative anatomy of the "Negro" and European, Soemmerring reported his observations on the physical and moral character of woman:

A boy will always dominate a girl, without knowing that he dominates, and knowing even less that he dominates because of his solid, strong body. He will dominate even when he has received the same nourishment, love and clothing as a girl. I have had the rare opportunity of seeing definite proof of this fact. From his earliest youth, Prince D . . . G was raised alongside his sister. Their training in all moral and physical matters was equivalent in every way. And yet, differences of masculinity and femininity in physical and moral character were always conspicuous. This is a fact of experience.<sup>99</sup>

Johann Ziegenbien propagated Soemmerring's ideas in German schools. Reading to the parents of a girls' school, Ziegenbien opened his lecture on "Female

Nature, Character, and Education” with Soemmerring’s findings that “already in the earliest stages of the embryo one finds sex differences. That boys will seize a stick while girls will take up a doll . . . that men rule the affairs of state while women govern the affairs of the home reflects nothing other than what is already in the seed of the embryo.”<sup>100</sup>

Medical manuals for women that appeared in France and Germany between the 1780s and 1830s also made use of the new findings on sex differences. These health manuals emphasized that physical differences between men and women must be taken into account for the proper treatment of their illnesses. These manuals also emphasized that the well-being of each sex depended on establishing a lifestyle appropriate to its particular physiology.<sup>101</sup> The authors of these manuals spoke of the physiological and moral character of woman in one and the same breath.<sup>102</sup>

Those who thought that social life in “harmony” with nature ensured individual well-being also thought that such a life ensured social stability. In his 1806 book on the character of the female sex, Carl Friedrich Pockels asserted that differences in bodily strength are “designed by nature as a necessary basis to ensure the social order between man, woman, and the family.”<sup>103</sup> Drawing from Rousseau, Roussel, and Georges Cuvier, Pockels found man and woman perfect but complementary beings. In 1830, medical doctor J. J. Sachs explained how physical complementarity led to complementary social roles for men and women:

The male body expresses positive strength, sharpening male understanding and independence, and equipping men for life in the State, in the arts and sciences. The female body expresses womanly softness and feeling. The roomy pelvis determines women for motherhood. The weak, soft members and delicate skin are witness of woman’s narrower sphere of activity, of home-bodiness, and peaceful family life.<sup>104</sup>

The French father of positivism, Auguste Comte, also considered the proper relation between the sexes the foundation of solid social order. Comte believed that the strength of the family rested on the natural subordination of the female to the male. Thus in his epic *Cours de philosophie positive*, Comte reasserted the growing belief that the proper social role of women is a question not of politics but of biology:

The sound philosophy of biology, especially the important theories of Gall, begins to offer a scientific resolution to the much acclaimed equality of the sexes. The study of anatomy and physiology demonstrates that radical differences, at once physical and moral . . . profoundly separate the one [sex] from the other.<sup>105</sup>

J. S. Mill’s moral arguments for women’s equality were unable to sway Comte from this view. Comte persisted in his belief that biology “has established the hierarchy of the sexes.”<sup>106</sup>

One important aspect of the definition of women's nature emphasized women's inability to do intellectual work or science of any kind. This view, expressed by Wilhelm von Humboldt but stretching back to Rousseau, held that women's physical weakness results in intellectual weakness. According to Humboldt, women are incapable of analytical or abstract thought. Women, he wrote, are given to subjective impressions; they reveal their inner life, they think in wholes, but don't ground their information in empirical data.<sup>107</sup> Hegel strengthened the growing association of masculinity with reason and science, and of femininity with feeling and the moral sphere of the home. Woman's ethical and intellectual character, he argued, made her inherently incapable of philosophy or science:

Women are capable of education, but they are not made for the more advanced sciences, philosophy and certain forms of artistic production, all of which require a universal faculty. Women may have quick wit, taste, and elegance, but they cannot attain the ideal. . . . Women regulate their actions not by the demands of universality, but by arbitrary inclinations and opinions . . . they follow the dictates of subjectivity, not objectivity.<sup>108</sup>

It is important to look at these texts on women's nature—medical and philosophical—in the context of women's participation in medicine. The search for sex differences on the part of anatomists also coincided with changes in the structure of seventeenth- and eighteenth-century medical care. Anatomists' interest in the distinctive character of women's body build came at a time when the professionalization of medical sciences was taking women's health care out of the hands of female midwives.<sup>109</sup> On the one hand, doctors stressed their concern for distinctively female problems in health care. Ackermann, for example, appended a chapter on women's health to his book on sex differences and argued that traditional medicine did not take into account differences in body build that might influence the cause and course of a sickness.<sup>110</sup> In order to treat an illness properly a physician was to take into account women's distinctive anatomy. The implication here was, of course, that midwives did not have the proper training to care for women's health. On the other hand, women were not thought capable of getting that training. They were not to work in the increasingly public realm of medicine but to remain in the home.<sup>111</sup> Women were defined as incapable of doing science by a medical community that was itself attempting to become more scientific.

At the same time that the idea of the "unscientific" woman drove a final nail in the coffin of midwifery, scientists presented their findings as "objective" or "value neutral." In the course of the nineteenth century, there emerged an increasing tendency to look to science as an arbiter of social questions. The promise of objectivity inspired hope that the "woman question" could be resolved by science. Anatomists stressed the "impartial" nature of their work. In his work on the comparative anatomy of the "Negro" and European, for example, Soemmerring

concluded that the Negro was “somewhat nearer the ape, particularly in respect to the brain, than the European.”<sup>112</sup> Yet Soemmerring argued that his work reflected what he called the “cold-blooded” findings of science and did not take a “moral” stand.<sup>113</sup> In a similar manner, Pockels insisted that his four-volume study of the character of woman was “impartial,” “purely empirical,” and following the “principles of reason.”<sup>114</sup>

If the scientific argument against women in science played a role in removing women from the medical profession, it was also invoked repeatedly to keep them out. In 1872, Professor Theodor Bischoff argued against the admission of women to the medical profession.<sup>115</sup> Using, as he said, the “impartial and certain” methods of science, he promised to prove that the “pure and unadulterated feminine nature” of woman is not a scientific one.<sup>116</sup> Bischoff’s central argument against women’s equal participation in medicine rested on scientific definitions of sex differences. Anyone who is familiar with the physical and mental differences between man and woman as discovered in anatomy and physiology, he wrote, could never support the equal participation of men and women in medicine.<sup>117</sup> Equality, he stated, can only be achieved where initial conditions are equal. He then spun off the (by then) familiar list of sex differences—in bones, muscles, nerves, and skulls—relying heavily on the work of Soemmerring and citing the supporting passages from Kant’s *Anthropologie*.<sup>118</sup>

Opposition to these and similar views on women came largely from outside the medical community. Already in 1744, Eliza Haywood reported in her journal, *The Female Spectator*, that anatomists were finding women to be physiologically incapable of deep thought. She believed this to be incorrect, and argued that the supposed delicacy of the female brain does not necessarily render it less “strong” than the male brain:

The Delicacy of those numerous Filaments which contain, and separate from each other what are call'd the Seats of Invention, Memory, and Judgment, may not, for anything they [the anatomists] can prove to the contrary, render them [women's brains] less strong.

Haywood was not a natural philosopher, however, and qualified her authority to speak of such matters; she wrote that “as I am not Anatomist enough to know whether there is really any such Difference or not between the Male and Female Brain, I will not pretend to reason on this Point.”<sup>119</sup> Like others of her time, Haywood bowed to claims of science to have a privileged access to truth.<sup>120</sup>

Asymmetries in social power forced adversaries on either side of the “woman question” to use markedly different forms of arguments to state their case.<sup>121</sup> Barred from science, women used what were essentially *moral* arguments to demand education and voting rights; scientists (by and large male) used the findings of anatomy and other sciences to argue that women were incapable of scientific endeavor. As science gained in social prestige, those who could not base their

arguments on scientific evidence were put at a disadvantage in social debate. Nineteenth-century feminist Hedwig Dohm, for example, was not reticent in her critique of science. Yet even she qualified her rebuttal of anatomist Theodor Bischoff with the words “I am no physiologist.”

Because Dohm wrote from outside the academy and not under the guise of science, her work was commonly viewed as merely polemical.<sup>122</sup> In 1875, an Austrian minister of health, Friedrich W. H. Ravoth, made explicit a common conception of the relationship between feminism of any kind and science. In a speech to the Assembly of German Scientists and Doctors, Ravoth stated:

Competent and qualified scientific research can and must face the dialectical, or rather, sophistical talk about the so-called woman question with a categorical imperative, and uphold unchangeable laws.<sup>123</sup>

Thus in the absence of women (one might say in opposition to women) nineteenth-century science defined feminine nature as essentially incommensurate with masculine nature. The “natural” inequalities between men and women seemed to justify social inequalities between the two sexes. Many believed that the social order parallels the natural order. Cultural historian Wilhelm Riehl, for example, held that the incommensurate nature of men and women shows that inequalities of society are based in natural law.<sup>124</sup> Scientific definitions of human “nature” were thus used to justify the channeling of men and women (as well as whites and blacks) into vastly different social roles. It was thought “natural” that men, by virtue of their “natural reason,” should dominate public spheres of government and commerce, science and scholarship, while women, as creatures of feeling, fulfilled their natural destiny as mothers, conservators of custom in the confined sphere of the home.

The consequences of this story, however, go beyond the exclusion of various groups—women or ethnic minorities—from the scientific community. Along with women, scientists excluded from science a specific set of moral and intellectual qualities defined as feminine. It was woman’s distinctive moral qualities—feeling and instinct—that were thought to dull her abilities to practice science. The true scientist was to be a man of “reason and truth.”

The feminization of feeling and the masculinization of reason was produced and reproduced by specific divisions of labor and power in European society. At the same time, it should be recognized that the “nature” of science is no more innate than the moral “nature” of man or woman. Science too has been shaped by social forces. One of those forces has been the persistent desire to distance science from the feminine, and to identify it with the masculine. The irony in the case of the female skeleton is that as modern science plunged headlong into the study of sex differences in the eighteenth century, it helped construct its own gender.



## Notes

---

1. Samuel Thomas von Soemmerring, *Tabula sceleti feminini juncta descriptione* ([Utrecht], 1796). My thanks to the staff of the Rare Book Collection of the Boston Medical Library in the Francis A. Countway Library, Harvard University, for their kind assistance with materials for this article. I also thank the Charlotte Newcombe Fellowship Program of the Woodrow Wilson Foundation, which provided support for the preparation of this manuscript. To those friends and critics who read earlier drafts—Robert Proctor, Margaret Rossiter, and Hal Cook—my thanks.
2. D'Arconville was one of a small number of women working in anatomy in eighteenth-century France. She published her work under the name and protection of Jean-J. Sue.
3. See Ernst Cassirer, *The Philosophy of the Enlightenment*, trans. F. C. A. Koellen and J. P. Pettegrove (Princeton, N.J., 1951), 234–52. See also Maurice Bloch and Jean Bloch, “Women and the Dialectics of Nature in Eighteenth-Century French Thought,” in *Nature, Culture and Gender*, ed. Carol P. McCormack and Marilyn Strathern (Cambridge, 1980), 25–41.
4. Although the need to reconcile an appeal to “natural equality of men” and the realities of slavery and the subordination of women became pressing only after the French and American revolutions, the dilemma first posed itself in the work of Locke. See Marvin Harris, *The Rise of Anthropological Theory* (New York, 1968), 80–107; William Stanton, *The Leopard's Spots* (Chicago, 1960), 1–15.
5. Charles Louis de Secondat, Baron de Montesquieu, *Lettres Persanes* (Paris, 1721), letter 38.
6. On this point see Steven Rose, Leon Kamin, and Richard Lewontin, *Not in Our Genes: Biology, Ideology and Human Nature* (London, 1984), 63–81; Ruth Bleier, *Science and Gender: A Critique of Biology and Its Theories on Women* (New York, 1984), 49ff.
7. See Londa Schiebinger, *Women and the Origins of Modern Science* (Ph.D. diss., Harvard University, 1984).
8. François Poullain de la Barre, *De l'égalité des deux sexes: Discours physique et moral* (Paris, 1673), 59.
9. See Sarah Pomeroy, *Goddesses, Whores, Wives, and Slaves* (New York, 1975); M. C. Horowitz, “Aristotle and Woman,” *Journal of the History of Biology* 9 (1976): 183–213; G. E. R. Lloyd, *Science, Folklore and Ideology* (Cambridge, 1983), 58–111.
10. On the continuity in medical views from the ancient to the medieval worlds see Vern L. Bullough, “Medieval Medical and Scientific Views of Women,” *Viator* 4 (1973): 487; Julia O'Faolain and Lauro Martines, *Not in God's Image: Women in History* (London, 1973), 130–39; Lester S. King, “The Transformation of Galenism,” *Medicine in Seventeenth-Century England*, ed. Allen Debus (Berkeley, 1974), 7–32; Ian Maclean, *The Renaissance Notion of Woman: A Study in the Fortunes of Scholasticism and Medical Science in European Intellectual Life* (Cambridge, 1980).
11. Paul Hoffmann, *La Femme dans la pensée des lumières* (Paris [1977]); Maclean, *Renaissance Notion of Woman*.
12. J. P. Lotichium, *Gynaecologia, das ist: grund- und ausführlicher Discurs von Perfection, und Fürtrefflichkeiten des löblichen Frawenzimmers: So allen und jeden ihren Feinden entgegen gesetzt* (Frankfurt, 1645), first dedication and p. 15.
13. Poullain de la Barre, *De l'égalité des deux sexes*, 60.

14. [Mary Astell], *An Essay in Defence of the Female Sex* (London, 1696), 12–13.
15. Hilda Smith, "Gynecology and Ideology in Seventeenth-Century England," in *Liberating Women's History*, ed. Berenice A. Carroll (Chicago, 1976), 98. On Harvey's discussion of the female role in reproduction see Carolyn Merchant, *The Death of Nature: Women, Ecology and the Scientific Revolution* (San Francisco, 1980), 155–62.
16. Maclean, *Renaissance Notion of Woman*, 29. Maclean notes that even though physiologists abandon Aristotle's woman-as-imperfect-male theory, they retain the belief that woman had a less perfect mental faculty than man (35).
17. Other examples of the meshing of the old and new include: André du Laurens, *Anatomica humani corporis historia* (Paris, 1593); Gaspard Bauhin, *Institutiones anatomicae corporis virilis et muliebris historiam exhibentes* (Basel, 1604); Helkiah Crooke, *A Description of the Body of Man* (London, 1615).
18. Andreas Vesalius, *De corporis humani fabrica* (Basel, 1543).
19. J. B. Saunders and C. D. O'Malley, *The Illustrations from the Works of Andreas Vesalius* (New York, 1950), 222–23.
20. In Galen's view, women's sex organs were analogous to men's but "imperfect and, as it were, mutilated." Women lacked sufficient heat to propel their sex organs outward.

Consider first [Galen wrote] whichever ones you please . . . think of the man's turned in and extending inward between the rectum and the bladder. If this should happen, the scrotum would necessarily take the place of the uteri [*sic*], with the testes lying outside, next to it on either side; the penis of the male would become the neck of the cavity that had been formed; and the skin at the end of the penis, now called the prepuce, would become the female pudendum itself. . . . In fact, you could not find a single male part left over that had not simply changed its position; for the parts that are inside in the woman are outside in the man. . . . Now just as mankind is the most perfect of all animals, so within mankind, the man is more perfect than the woman, and the reason for his perfection is his excess heat, for heat is Nature's primary instrument. . . . The woman is less perfect than the man in respect to the generative parts. For the parts were formed within her when she was still a foetus, but could not because of the defect in heat emerge and project on the outside.

*On the Usefulness of the Parts of the Body*, trans. Margaret May, vol. 2 (Ithaca, N.Y., 1968), 628–30. See also Esther Fischer-Homberger, *Krankheit Frau und andere Arbeiten zur medizinischen Geschichte der Frau* (Bern, 1979).

21. See Fritz Weindler, *Geschichte der gynäkologisch-anatomischen Abbildung* (Dresden, 1908), fig. 37, p. 41. See also G. Wolf-Heidegger and Anna Maria Cetto, *Die anatomische Sektion in bildlicher Darstellung* (Basel, 1967).
22. Kate Campbell Hurd-Mead, *A History of Women in Medicine* (Haddam, Conn., 1938), 358–59.
23. Vesalius, *De corporis humani fabrica*, frontispiece.
24. Saunders and O'Malley, *Illustrations from the Works of Vesalius*, 170. Female bodies were hard to come by, but then so were male bodies. The story is told that Vesalius saw a body of a male who had been executed swinging from a tree. Waiting until nightfall, he returned and cut it down.
25. William Cheselden, *Anatomy of the Bones* (1713; Boston, 1795), 276.
26. The illustrator merely drew what he or she saw. In addition to beards and breasts, illustrators often drew the ropes used to hold the body during dissection.
27. William Cowper, *The Anatomy of Humane Bodies* (London, 1737).

28. Cowper, *Anatomy of Humane Bodies*, commentary to plate 2.
29. Ibid. Harvey also noted that women are clad “as with a furred mantle.” The abundant layer of fat under women’s skin explains their good humor. “Men,” he wrote, “are lean . . . and they are of a melancholic disposition. Fat is useful in many ways. . . . It is the result of abundant nutrition and promotes health”; William Harvey, *Lectures on the Whole of Anatomy on the Male and Female Body* (1616), trans. Gweneth Whitteridge (London, 1964), 53.
30. J. J. Sachs, *Ärztliches Gemälde des weiblichen Lebens im gesunden und krankhaften Zustände aus physiologischem, intellektuellem und moralischem Standpunkte: Ein Lehrbuch für Deutschlands Frauen* (Berlin, 1830), 1.
31. Edmond Thomas Moreau, *Quaestio medica: An praeter genitalia sexus inter se discrepent?* (Paris, 1750).
32. Pierre Roussel, *Système physique et moral de la femme, ou tableau philosophique de la constitution, de l’état organique, du tempérament, des moeurs, & des fonctions propres au sexe* (Paris, 1775), 2. This became a common theme. Dr. G. Jouard made a similar point in his *Nouvel essai sur la femme* (Paris, 1804), 3 and 36. The German physician Carl Ludwig Klose also argued that it is not the uterus that makes woman what she is. Even women from whom the uterus has been removed, he stressed, retain feminine characteristics; *Über den Einfluss des Geschlechts-Unterschiedes auf Ausbildung und Heilung von Krankheiten* (Stendal, 1829), 28–30.
33. Jakob Ackermann, *De discrimine sexuum praeter genitalia* (Mainz, 1788); *Über die körperliche Verschiedenheit des Mannes vom Weibe ausser Geschlechtstheilen*, trans. Joseph Wenzel (Koblenz, 1788), 2–5. The German edition is used throughout.
34. Ibid. Anatomists were not alone in their search for differences between the sexes. Physiologists, too, attempted to identify fundamental chemical components underlying differences between men and women. Sexual differences were deduced from the proportion of oxygen and hydrogen in the blood (Ackermann); from the proportion of acids in the body (Mitchill); from the balance of oxygen to carbon (Karl Burdach). At times modern definitions of sexual differences bore striking resemblance to the older Galenic tradition. In 1808, Dr. Johann Christian Rosenmüller read a paper to the Physikalisch-Medicinischen Societät zu Erlangen emphasizing that in the earliest development of the fetus, sex organs are neither masculine nor feminine. According to Rosenmüller, this continuity between the sexes meant that there must be great similarity between male and female sex organs; “Über die Analogie der männlichen und weiblichen Geschlechtstheile,” *Abhandlungen der physikalisch-medicinischen Societät zu Erlangen* 1 (1810), 47–51. Rosenmüller coupled this view with a revised theory of humors. In Galen’s view, heat determined sexuality—the right testicle being warmer than the left generated males. At the end of the eighteenth century, the burning of oxygen in the blood had been discovered to produce heat. Rosenmüller believed that sex is determined by the amount of oxygen in the fetus. The egg contains a preponderance of oxygen; the sperm has an excess of hydrogen. If, when they merge, oxygen predominates, the “sexless seed” will develop into a male; if hydrogen predominates it will develop into a female. If the proportions are equal, a hermaphrodite will develop. See Johann Christian Jörg, *Handbuch der Krankheiten des Weibes, nebst einer Einleitung in die Physiologie und Psychologie des weiblichen Organismus* (Leipzig, 1831), 6ff. Rosenmüller used the oxygen/hydrogen ratio to explain the external or internal development of sex organs. “The surplus of oxygen,” he believed, “causes the external development of male sex organs, while the overproduction of hydrogen causes the internal development of female organs.”

35. Yvonne Knibiehler and Catherine Fouquet, *La Femme et les médecins* (Paris, 1983), 124. See also Elisabeth Badinter, *L'Amour en plus* (Paris, 1980).
36. On the rise of the ideal of motherhood, see Marlene LeGates, "The Cult of Womanhood in Eighteenth-Century Thought," *Eighteenth-Century Studies* 10, no. 1 (1976): 21–39; Margaret Darrow, "French Noblewomen and the New Domesticity, 1750–1850," *Feminist Studies* 5, no. 1 (1979): 41–65; Silvia Bovenschen, *Die imaginierte Weiblichkeit: Exemplarische Untersuchungen zu kulturgeschichtlichen und literarischen Präsentationsformen des Weiblichen* (Frankfurt, 1979); Barbara Corrado Pope, "Revolution and Retreat: Upper-Class French Women After 1789," in *Women, War and Revolution*, ed. Carol Berkin and Clara Lovett (New York, 1980), 215–36; Susanne Risse-Stumbries, *Erziehung und Bildung der Frau in der zweiten Hälfte des 18. Jahrhunderts* (Tübingen, 1980); Badinter, *L'Amour en plus*; Mitzi Myers, "Reform or Ruin: A Revolution in Female Manners," *Studies in Eighteenth-Century Culture* 11 (1982).
37. "The animal within them [the womb or matrix within women] is desirous of procreating children, and when remaining unfruitful beyond its proper time, gets discontented and angry, and wandering in every direction through the body, closes up the passages of breath, and by obstructing respiration, drives them to extremity, causing all varieties of disease"; Plato *Timaeus* 91c, in *The Collected Dialogues of Plato*, ed. Edith Hamilton and Huntington Cairns (Princeton, N.J., 1961). Throughout the ancient period the uterus was portrayed in a variety of forms—a tortoise, a newt, a crocodile; Harold Speert, *Iconographia Gyniatrica: A Pictorial History of Gynecology and Obstetrics* (Philadelphia, 1973), 8.
38. Ackermann, *Über die körperliche Verschiedenheit des Mannes vom Weibe ausser Geschlechtstheilen*, appendix.
39. For Vesalius see the six plates originally printed without title, now known as *Tabulae anatomicae sex* (1538), plate 87, figs. 2–4.
40. Ian Maclean dates the reevaluation of women's sex organs much earlier. He found that after 1600, one sex is no longer thought to be an imperfect and incomplete version of the other, and that by the end of the sixteenth century, most anatomists abandon Galenic parallelism; *Renaissance Notion of Women*, 33. Nonetheless the Galenic view persisted well into the eighteenth century in the works of writers such as Diderot in France and Rosenmüller in Germany. Important naturalists such as Georges-Louis Buffon held that women's ovaries were testicles as late as 1749; *Histoire naturelle*, vol. 3 (Paris, 1749), 264.
41. Jacques-Louis Moreau, *Histoire naturelle de la femme, suivie d'un traité d'hygiène appliquée à son régime physique et moral aux différentes époques de sa vie*, vol. 1 (Paris 1803), 68–69.
42. Klose, *Über den Einfluss des Geschlechts-Unterschiedes*, 28–33.
43. Bernhard Albinus, "Account of the Work," in *Table of the Skeleton and Muscles of the Human Body* (London, 1749).
44. In the seventeenth and eighteenth centuries, the number of existing anatomical plates was small and well known within the community of European anatomists. Once a part of the human body had been adequately rendered, the plate was reproduced and used by other anatomists.
45. Bernhard Albinus, *Annotationes academicae* (1754–68), 7, 11–14, 30–50; quoted in Ludwig Choulant, *History and Bibliography of Anatomic Illustration*, trans. Mortimer Frank (Chicago, 1920), 277.
46. Albinus gave a description of a female skeleton in his *De sceletio humano* but does not provide an illustration; B. S. Albini, *De sceletio humano* (Leiden, 1762), chap. 126.
47. Gaspard Bauhin, *Theatrum anatomicum* (Frankfurt, 1605), plate 4, p. 247.

48. Pierre Tarin, *Ostéo-graphie, ou description des os de l'adulte, du fœtus* (Paris, 1753), plate 23.
49. Alexander Monro, *The Anatomy of the Humane Bones* (Edinburgh, 1726), appendix, 341.
50. *Ibid.*, 340–44.
51. William Cheselden, *Osteographia or the Anatomy of the Bones* (London, 1733), plates 34 and 35.
52. D'Arconville (1720–1805) was well known by her contemporaries. She published widely; her works include *Essai pour servir à l'histoire de la putréfaction; Vie de Marie de Médicis, reine de France et de Navarre*; the French translation of Peter Shaw's work on chemistry. See Louis-Gabriel Michaud, *Biographie universelle ancienne et moderne*, vol. 41 (Paris, 1843).
53. D'Arconville's role in the publication of the *Ostéologie* remains unclear. The title page attributes the work to Sue: *Traité d'Ostéologie, traduit de l'Anglois de M. Monro, Où l'on ajouté des Planches en Taille-douce, qui représentent au naturel tous les Os de l'Adulte & du Fœtus, avec leurs explications, Par M. Sue, Professeur & Démonstrateur d'Anatomie aux Ecoles Royales de Chirurgie, de l'Académie Royale de Peinture & de Sculptur* (Paris, 1759). Sue's son, Jean-J. Sue, reproduced the plates under his own name in 1788; *Elémens d'anatomie, à l'usage des peintres, des sculpteurs, et des amateurs* (Paris, 1788). In Britain, Andrew Bell and John B. Barclay also attributed the plates to Sue. See Andrew Bell, *Anatomica Britannica: A System of Anatomy; Illustrated by Upwards of Three Hundred Copperplates, from the Most Celebrated Authors in Europe* (Edinburgh, 1798), and John Barclay, *The Anatomy of the Bones of the Human Body, Represented in a Series of Engravings, Copied from the Elegant Tables of Sue and Albinus* (Edinburgh, 1829). Current literature, such as Paule Dumaitre's *Histoire de la médecine et du livre médical* (Paris, 1978), 285, credits d'Arconville with the translation but Sue with the illustrations.

Though I have been unable to find manuscripts or letters that might solve the mystery of d'Arconville's contribution to the *Ostéologie*, I believe that d'Arconville should be credited with the translation and with overseeing the drawing of the illustrations. I draw this conclusion for two reasons. First, in the introduction to the *Ostéologie*, the voices of the translator and the illustrator are one and the same. Speaking in the first person, the translator states, "The plates were drawn under my eyes, and there were many that I had redone many times in order to correct the slightest fault." A second piece of evidence pointing to a leading role for d'Arconville in the *Ostéologie* is that the introduction to the work is reprinted in a collection of works attributed to her.

The confusion about d'Arconville's role arises from the fact that, as Pierre-Henri-Hippolyte Bodard tells us, she was careful always to guard her anonymity; *Cours de botanique médicale comparée*, vol. 1 (Paris, 1810), xxvi–xxx. D'Arconville was a sharp critic of society women of her day, in particular those who (in her view) vainly paraded their literary achievement; see her essay "Sur les Femmes" in *Mêlanges de littérature, de morale et de physique*, 7 vols. (Amsterdam, 1775) 1:368–83.

54. Soemmerring, *Tabula sceleti feminini*. 1797 is the date given for the publication of this plate in Choulant, *History of Anatomic Illustration*; Adolph Callisen, *Medicinisches Schriftsteller-Lexicon*, vol. 18 (Copenhagen, 1843), 353; and *The Dictionary of Scientific Biography* article on Soemmerring. There is, however, a 1796 first edition at the Countway Library, which is the one I have used. The two editions or printings are nearly identical.
55. *Journal der Empfindungen: Theorien und Widersprüche in der Natur- und Arzneiwissen-*

- schaft 6, no. 18 (1797): 17–18.
56. It was thought that a woman did not reach maturity with the onset of menstruation but only with age eighteen or twenty, after the birth of her first child; see Jörg, *Handbuch der Krankheiten des Weibes*, 6ff.
  57. Choulant, *History and Bibliography of Anatomic Illustration*, 306–7.
  58. Sue, *Ostéologie*, text to plate 4.
  59. Bell, *Anatomica Britannica*; Barclay, *Anatomy of the Bones of the Human Body*.
  60. Ibid., commentary to plate 32. Barclay gives the date of Soemmerring's publication incorrectly as 1787.
  61. Ibid.
  62. Although Moreau praised Soemmerring's work, the illustration of the female skeleton in his own work bears no resemblance to Soemmerring's. In its exaggerations of the width of the pelvis, Moreau's skeleton is interestingly similar to d'Arconville's. See Moreau, *Histoire naturelle de la femme*, 1:95.
  63. Quoted in Choulant, *History and Bibliography of Anatomic Illustration*, 277.
  64. Albinus, "Account of the Work."
  65. Quoted in Ackermann, *Über die Verschiedenheit*, 5–7.
  66. Choulant, *History and Bibliography of Anatomic Illustration*, 302.
  67. Ibid.
  68. Soemmerring, *Tabula sceleti feminini*, commentary to plate.
  69. Albinus, "Account of the Work."
  70. Roussel, *Système physique et moral de la femme*, 6.
  71. See Stephen Jay Gould, *Ontogeny and Phylogeny* (New York, 1977).
  72. Both J. F. Blumbach and Pierre de Maupertuis took Caucasian skin to be the norm of which black skin was a degenerate form; see John C. Greene, *The Death of Adam*, (Ames, Ia., 1959), 224 and 231.
  73. As early as 1615, Helkiah Crooke had rejected Galen's notion that the testicles should rank as the most noble part of the human body. He also rejected Aristotle's notion that the heart should be honored as the most able part of the human body and ascribed superiority instead to the brain because its functions are more "divine and noble" than those of the heart. Crooke judged the brain in terms of the new philosophy as the "seate of the intelligible or understanding faculty": "We are enforced to yeelde the superiority to the braine. . . . All sense and voluntary motion proceede from it, the habitation it is of Wisedome, the Shrine of Memory, Judgement and Discourse, which are the prerogatives of Man above all other Creatures. This is the Prince of the Family, the head is the head of the tribe . . . yea all were created onely for his use and behoofe"; *Description of the Body of Man*, 45.
  74. Georg Wilhelm Friedrich Hegel, *Phänomenologie des Geistes* (1807), in *Werke*, ed. Eva Moldenhauer and Karl Michel, 20 vols. (Frankfurt, 1969–1971), 3:248.
  75. Samuel Thomas von Soemmerring, *Vom Baue des menschlichen Körpers*, 5 Vols. (1796; Frankfurt, 1800), vol. 1, section 61, p. 82. Soemmerring believed that larger skulls hold larger brains, that larger brains are capable of greater intellectual activity, and, consequently, that intellectual ability is innate (5:392).
  76. Ackermann, *Über die Verschiedenheit*, 146.
  77. Barclay, *Anatomy of the Bones of the Human Body*, text to plate 32.
  78. E. W. Posner, *Das Weib und das Kind* (Glogau, 1847), 9–10.
  79. Ruth Kelso, *The Doctrine of the Renaissance Lady* (Chicago, 1978), 213.
  80. "For the free rules the slave, the male the female, and the man the child [each] in a different way." Aristotle justified the subordination of slaves, women, and children

- in terms of the supposedly lesser degree of rationality each possesses: "All possess the various parts of the soul, but possess them in different ways; for the slave has not yet got the deliberative part at all, and the female has it, but without full authority, while the child has it, but in an undeveloped form"; Aristotle, *The Politics*, trans. H. Rackham (London, 1932), 63.
81. Heidi Rosenbaum, *Formen der Familien* (Frankfurt, 1982), 288–89.
  82. Quoted in Ackermann, *Über die Verschiedenheit*, 5.
  83. On this point see Marian Lowe, "The Dialectic of Biology and Culture," *Woman's Nature: Rationalizations of Inequality*, ed. Marian Lowe and Ruth Hubbard (New York, 1983), 39–62.
  84. In the nineteenth century, poor women consistently had more deficient diets than their husbands, because they allowed their men and children more and better food; Mary Chamberlain, *Old Wives' Tales: Their History, Remedies and Spells* (London, 1981), 107.
  85. Theodor L. W. von Bischoff, *Das Studium und die Ausübung der Medicin durch Frauen* (Munich, 1872), 45.
  86. On "social inequality as natural law" see Wilhelm Riehl, *Die Naturgeschichte des Volkes als Grundlage einer deutschen Socialpolitik*, vol. 3 (1856; Stuttgart, 1956), 3.
  87. On the polarization of gender roles, see Karin Hausen, "Die Polarisierung der Geschlechtscharaktere," *Sozialgeschichte der Familie in der Neuzeit*, ed. Werner Conze (Stuttgart, 1976), 363–93; Barbara Duden, "Das schöne Eigentum: Zur Herausbildung des bürgerlichen Frauenbildes an der Wende vom 18. zum 19. Jahrhundert," *Kursbuch* 47 (1977): 125–40; Ruth Bloch, "Untangling the Roots of Modern Sex Roles: A Survey of Four Centuries of Change," *Signs* 4, no. 2 (1978): 237–57.
  88. See Sheila Rowbotham, *Women, Resistance and Revolution* (London, 1972); Maïte Albistur and Daniel Armogathe, *Histoire du féminisme français*, 2 vols. (Paris, 1977); Bloch and Bloch, "Women and the Dialectics of Nature," 25–41; Joan Kelly, "Early Feminist Theory and the Querelle des Femmes, 1400–1789," *Signs* 8, no. 1 (1982): 4–28; Katharine Rogers, *Feminism in Eighteenth-Century England* (Chicago, 1982); Hilda Smith, *Reason's Disciples: Seventeenth-Century English Feminists* (Chicago, 1982); Dale Spender, *Women of Ideas and What Men Have Done to Them: From Aphra Behn to Adrienne Rich* (London, 1982); Susan Bell and Karen Offen, eds., *Women, the Family and Freedom: The Debate in Documents, vol. 1, 1750–1880* (Stanford, Calif., 1983).
  89. Jean-Jacques Rousseau, *Emile* (1762), in *Oeuvres complètes*, ed. Bernard Gagnebin and Marcel Raymond, 4 vols. (Paris, 1959–69), 4:693.
  90. Rousseau's views are so well known that I have chosen to focus here on less well-known followers of Rousseau. On Rousseau see Susan Moller Okin, *Women in Western Political Thought* (Princeton, N.J., 1979); Bovenschen, *Die imaginierte Weiblichkeit*; Zillah Eisenstein, *The Radical Future of Liberal Feminism* (New York, 1981), esp. chap. 4; Jean Elshtain, *Public Man, Private Woman: Women in Social and Political Thought* (Princeton, N.J., 1981); Joel Schwartz, *The Sexual Politics of Jean-Jacques Rousseau* (Chicago, 1984).
  91. Bloch and Bloch, "Women and the Dialectics of Nature," 35.
  92. Rousseau, *Emile*, 692.
  93. C. Helvétius, *De l'esprit* (Paris, 1758); Jean le Rond d'Alembert, *Lettre de M. d'Alembert à M. J.-J. Rousseau* (Amsterdam, 1759); M.-J. Condorcet, *Esquisse d'un tableau historique des progrès de l'esprit humain* (Paris, 1794).
  94. Mary Wollstonecraft, *Vindication of the Rights of Woman* (London, 1792); Olympe de Gouges, "Declaration of the Rights of Woman and Citizen in 1791," in Bell and Offen,

- Women, the Family and Freedom*, 1:105–9; [Theodor von Hippel], *Über die bürgerliche Verbesserung der Weiber* (Berlin, 1792).
95. *Encyclopédie ou Dictionnaire Raisonné des Sciences, des Arts, et des Métiers* (Neuchâtel, 1765), s.v. “squelette.”
  96. Roussel, *Système physique et moral de la femme*, 12.
  97. *Ibid.*, 22–23. For the relationship between environmentalists of the Enlightenment and sex differences, see L. J. Jordanova, “Natural Facts: A Historical Perspective on Science and Sexuality,” *Nature, Culture and Gender*, ed. Carol P. MacCormack and Marilyn Strathern (Cambridge, 1980), 42–69.
  98. Roussel, *Système physique et moral de la femme*, xvi. Roussel may well have picked up this sentiment from Voltaire. Jacques-Louis Moreau quotes Voltaire saying that “the physical always rules the moral” in his *Histoire naturelle de la femme*, 42. On Roussel see also Michèle Le Doeuff, “Pierre Roussel’s Chiasmata: From Imaginary Knowledge to the Learned Imagination,” *I & C* 9 (Winter 1981–82): 39–63.
  99. Samuel Thomas von Soemmerring, *Über die körperliche Verschiedenheit des Negers vom Europäer* (Frankfurt, 1785), ix. That Soemmerring wrote about women in a book on race is not surprising, for Soemmerring viewed race in the same way he viewed sex: as penetrating the entire life of the organism. He wrote: “If skin is the only difference then the Negro might be considered a black European. The Negro is, however, so noticeably different from the European that one must look beyond skin color” (2).
  100. Johann Wilhelm Heinrich Ziegenbier, *Aussprüche über weibliche Natur, weibliche Bestimmung, Erziehung und Bildung* (Blankenburg, 1808), 1.
  101. A number of manuals on the illnesses of women appeared in the late eighteenth and early nineteenth centuries; among them are: Jean Astruc, *Traité des maladies des femmes*, 2 vols. (Avignon, 1768); [Anonymous], *Der Arzt der Frauenzimmer, oder die Kunst, dieselben gesund zu erhalten* (Leipzig, 1773); Jörg, *Handbuch der Krankheiten des Weibes* (1832); Sachs, *Ärztliches Gemälde des weiblichen Lebens* (1830).
  102. On the relation between the moral and physical characteristics of woman see Knibiehler and Fouquet, *La Femme et les médecins*, esp. chap. 4.
  103. Carl Friedrich Pockels, *Versuch einer Charakteristik des weiblichen Geschlechts*, vol. 1 (Hanover, 1806), 6 and 8. For other literature of this type, see Antoine-Léonard Thomas, *Essai sur le caractère, les mœurs, et l’esprit des femmes dans les différents siècles* (Paris, 1773); [Ernst Brandes], *Über die Weiber* (Leipzig, 1787) and *Betrachtungen über das weibliche Geschlecht und dessen Ausbildung in dem geselligen Leben* (Hanover, 1802); C. Meiners, *Untersuchungen über der Naturgeschichte der Menschenspecies* (Tübingen, 1811); Immanuel Kant, *Anthropologie* (Königsberg, 1798); A. F. Nolde, *Momenta quaedam circa sexus differentiam* (Göttingen, 1788); Gabriel Jouard, *Nouvel essai sur la femme considérée comparativement à l’homme* (Paris, 1804); K. F. Burdach, *Die Physiologie als Erfahrungswissenschaft* (Leipzig, 1826).
  104. Sachs, *Ärztliches Gemälde des weiblichen Lebens*, 25, 47.
  105. Auguste Comte, *Cours de philosophie positive*, vol. 4 (Paris, 1839), 569–70.
  106. Auguste Comte to J. S. Mill, 16 July 1843, in *Lettres inédites de J. S. Mill à A. Comte avec les réponses de Comte*, ed. L. Lévy-Bruhl (Paris, 1899), 231.
  107. Wilhelm von Humboldt, “Über den Geschlechtsunterschied und dessen Einfluss und die organische Natur” and “Über die männliche und weibliche Form,” in *Neudrucke zur Psychologie*, ed. Fritz Giese, vol. 1 (1917), 110.
  108. Georg Wilhelm Friedrich Hegel, *Grundlinien der Philosophie des Rechts* (1821), in *Werke*, 7:319–20.



109. Midwives held a traditional monopoly on the certification of virginity and on birthing until the seventeenth century. Midwives received certification from other midwives, or they merely went into practice after serving an apprenticeship with an experienced midwife. On midwifery, see Barbara Ehrenreich and Deirdre English, *For Her Own Good: 150 Years of the Experts' Advice to Women* (New York, 1978); G. Elmeer, "The Regulation of German Midwifery in the Fourteenth, Fifteenth, and Sixteenth Centuries" (M.D. thesis, Yale University School of Medicine, 1963); Richard L. Petrelli, "The Regulation of French Midwifery During the *Ancien Régime*," *Journal of the History of Medicine and Allied Sciences* 16, no. 3 (July 1971), 276–92; Thomas R. Forbes, "The Regulation of English Midwives in the Sixteenth and Seventeenth Centuries," *Medical History* 8, no. 3 (July 1964): 235–44; H. R. Spencer, *The History of British Midwifery from 1650 to 1800* (London, 1927); A. G. Debus, *Medicine in Seventeenth-Century England* (Berkeley, 1974); Jean Donnison, *Midwives and Medical Men* (New York, 1977); Toby Gelfand, *Professionalizing Modern Medicine: Paris Surgeons and Medical Science and Institutions in the Eighteenth Century* (Westport, Conn. 1980).
110. Ackermann, "Krankheitslehre der Frauenzimmer," appendix to *Über die Verschiedenheit*.
111. Hilda Smith, "Gynecology and Ideology in Seventeenth-Century England," 98.
112. Soemmerring, *Über die körperliche Verschiedenheit des Negers vom Europäer*, xiv.
113. *Ibid.*, xix.
114. Pockels, *Versuch einer Charakteristik des weiblichen Geschlechts*, 1:viii–xviii.
115. For a similar story in England and the United States, see Joan Burstyn, "Education and Sex: The Medical Case Against Higher Education for Women," *Proceedings of the American Philosophical Society* 117 (1973): 79–89; Janet Sayer, *Biological Politics: Feminist and Anti-Feminist Perspectives* (London, 1982); Louise Newman, ed., *Men's Ideas/Women's Realities: Popular Science, 1870–1915* (New York, 1985).
116. Bischoff, *Das Studium und die Ausübung der Medicin durch Frauen*, 47.
117. *Ibid.*, 14 and 48.
118. *Ibid.*, 15 and 20.
119. Eliza Haywood, *The Female Spectator* 2 (1744): 240–41.
120. In her 1802 book *On the Appropriateness of the Admission of Women to Higher Education*, Amelia Holst argued that no anatomist had ever proved that women's brains are organized differently from men's; *Über die Bestimmung des Weibes zur höhern Geistesbildung* (Berlin, 1802), 91. This is, of course, exactly what craniologists set out to do.
121. For the changing relation of scientific and moral discourse see Robert N. Proctor, "The Politics of Purity: Origins of the Ideal of Neutral Science" (Ph.D. diss., Harvard University, 1984).
122. Hedwig Dohm, *Die wissenschaftliche Emancipation der Frauen* (Berlin, 1874). On Dohm see Renate Duelli-Klein, "Hedwig Dohm: Passionate Theorist," in *Feminist Theorists: Three Centuries of Women's Intellectual Traditions*, ed. Dale Spender (London, 1983), 165–83. Nor did training in science remove the taint of "moralism" from opposition to the mainstream. In France, Jenny d'Héricourt, a woman well trained in physiology, raised her voice in opposition to the prevailing wisdom; *A Woman's Philosophy of Woman; or, Woman Affranchised* (New York, 1864). I thank Karen Offen for information about Héricourt. In the United States, Antoinette Brown Blackwell also refuted Darwin's claim that women represented a primitive stage of evolution; *The Sexes Throughout Nature* (New York, 1875).
123. Friedrich W. T. Ravoth, "Über die Ziele und Aufgaben der Krankenpflege," quoted

in Helga Rehse, "Die Rolle der Frau auf den Naturforscherversammlungen des 19. Jahrhunderts," *Die Versammlung deutscher Naturforscher und Ärzte im 19. Jahrhundert*, ed. Heinrich Schipperges, in *Schriftenreihe der Bezirksärztekammer Nordwürttemberg* 12 (1968): 126.

124. Riehl, *Die Naturgeschichte des Volkes*, 3:3–5.