and like a soldier time expired grows weary, and the hens too, like plants, become past laying and are exhausted." Only now do we realize that Harvey's account of life's drama has been flitting between the barnyard and the bedroom. Thus for Harvey, as much as for the confirmed Galenist, the heats and passions of the body express the hierarchy of creation.

Harvey's new epistemology and substantive discoveries led right back to new versions of old stories. Generation, the body's most social function, remained beyond the reach of a nonexistent neutral language of organs and functions. Desperate to understand how it all worked, Harvey spun story after poignant story about sexual difference, always pretending that it was Nature herself who spoke.

In the eighteenth century, the voice of Nature would be heard more loudly. Meaning, it would be thought then, existed not in the echoes of macrocosm and microcosm but in the thing itself. The mechanical world picture promised truth from the material world. But a new epistemology would not shield sexual anatomy and reproduction from the demands of culture. While the one flesh did not die—it lives today in many guises—two fleshes, two new distinct and opposite sexes, would increasingly be read into the body. No longer would those who think about such matters regard woman as a lesser version of man along a vertical axis of infinite gradations, but rather as an altogether different creature along a horizontal axis whose middle ground was largely empty.

FIVE

Discovery of the Sexes

> The bicycle's triumph . . . necessitates an androgynous outfit worn by its adepts of the weaker sex . . . Will we never make our skirted publishers and sociologists in dresses understand that a woman is neither equal nor inferior nor superior to a man, that she is a being apart, another thing, endowed with other functions by nature than the man with whom she has no business competing in public life? A woman exists only through her ovaries.
>
> VICTOR JOZÉ, 1895

Sometime in the eighteenth century, sex as we know it was invented. The reproductive organs went from being paradigmatic sites for displaying hierarchy, resonant throughout the cosmos, to being the foundation of incommensurable difference: "women owe their manner of being to their organs of generation, and especially to the uterus," as one eighteenth-century physician put it.[1] Here was not only an explicit repudiation of the old isomorphisms but also, and more important, a rejection of the idea that nuanced differences between organs, fluids, and physiological processes mirrored a transcendental order of perfection. Aristotle and Galen were simply mistaken in holding that female organs are a lesser form of the male's and by implication that woman is a lesser man. A woman is a woman, proclaimed the "moral anthropologist" Moreau in one of the many new efforts to derive culture from the body, everywhere and in all things, moral and physical, not just in one set of organs.[2]

Organs that had shared a name—ovaries and testicles—were now linguistically distinguished. Organs that had not been distinguished by a name of their own—the vagina, for example—were given one. Structures that had been thought common to man and woman—the skeleton and the nervous system—were differentiated so as to correspond to the cul-

tural male and female. As the natural body itself became the gold standard of social discourse, the bodies of women—the perennial other—thus became the battleground for redefining the ancient, intimate, fundamental social relation: that of woman to man. Women's bodies in their corporeal, scientifically accessible concreteness, in the very nature of their bones, nerves, and, most important, reproductive organs, came to bear an enormous new weight of meaning. Two sexes, in other words, were invented as a new foundation for gender.

Woman's purported passionlessness was one of the many possible manifestations of this newly created sex. Female orgasm, which had been the body's signal of successful generation, was banished to the borderlands of physiology, a signifier without a signified. Previously unquestioned, the routine orgasmic culmination of intercourse became a major topic of debate. The assertion that women were passionless; or alternatively the proposition that, as biologically defined beings, they possessed to an extraordinary degree, far more than men, the capacity to control the bestial, irrational, and potentially destructive fury of sexual pleasure; and indeed the novel inquiry into the nature and quality of female pleasure and sexual allurement—all were part of a grand effort to discover the anatomical and physiological characteristics that distinguished men from women. Orgasm became a player in the game of new sexual differences.

This did not happen all at once, nor did it happen everywhere at the same time, nor was it a permanent shift. When in the 1740s the young Princess Maria Theresa was worried that she had not immediately become pregnant after her marriage to the future Hapsburg emperor, her physician responded with advice that was no different from what Soranus might have offered a Roman matron: "Ceterum censeo vulvam Sanctissimae Majestatis ante coitum esse titillandum" (Moreover, I think the vulva of Her Most Holy Majesty should be titillated before intercourse.) She bore more than a dozen children.[3] Physicians in the nineteenth and early twentieth centuries could offer little more, and even today doctors disabuse patients of beliefs as old as Hippocrates:

> Dear Dr. Donohue: I am ashamed to ask my doctor: Do you only get pregnant when you have an orgasm?
>
> *Answer:* Pregnancy results when sperm meets and fertilizes an egg. Orgasm has nothing to do with it.[4]

As for the one-sex model, it too lived on. In the eighteenth and nineteenth centuries, books like *Aristotle's Masterpiece* and Nicholas Venette's *The Art of Conjugal Love,* or to a lesser extent the Pseudo-Albertus Magnus' *Secrets of Women,* transmitted Galenic learning to hundreds of thousands of lay readers, whatever their doctors might have thought. And in a variety of contexts, physicians themselves also spoke in the language of the one-sex model (such as those who feared that German women workers engaged in unfeminine occupations would become *Mannweiber,* male women).[5]

There are two explanations for how the two modern sexes as we imagine them were, and continue to be, invented: one is epistemological and the other is, broadly speaking, political.[6] The epistemological explanation in turn has at least two articulations. The first is part of the story in which fact comes to be more clearly distinguished from fiction, science from religion, reason from credulity. The body is the body is the body, said a new group of self-appointed experts with ever more authority, and there are only certain things it can do. Lactating monks, women who never ate and exuded sweet fragrance, sex changes at the whim of the imagination, bodies in paradise without sexual difference, monstrous births, women who bore rabbits, and so on, were the stuff of fanaticism and superstition even if they were not so far beyond the bounds of reason as to be unimaginable. Skepticism was not created in the eighteenth century, but the divide between the possible and the impossible, between body and spirit, between truth and falsehood, and thus between biological sex and theatrical gender, was greatly sharpened.

The second part of the epistemological explanation is essentially the one given by Foucault: the episteme "in which signs and similitudes were wrapped around one another in an endless spiral," in which "the relation of microcosm to macrocosm should be conceived as both the guarantee of that knowledge and the limit of its expansion," ended sometime in the late seventeenth century.[7] All the complex ways in which resemblances among bodies, and between bodies and the cosmos, confirmed a hierarchic world order were reduced to a single plane: nature. In the world of reductionist explanation, what mattered was the flat, horizontal, immovable foundation of physical fact: sex.

Or, put differently, the cultural work that had in the one-flesh model been done by gender devolved now onto sex. Aristotle did not need the facts of sexual difference to support the claim that woman was a lesser being than man; it followed from the *a priori* truth that the material cause is inferior to the efficient cause. Of course males and females were in daily life identified by their corporeal characteristics, but the assertion that in

generation the male was the efficient and the female the material cause was, in principle, not physically demonstrable; it was itself a restatement of what it *meant* to be male or female. The specific nature of the ovaries or the uterus was thus only incidental to defining sexual difference. By the eighteenth century, this was no longer the case. The womb, which had been a sort of negative phallus, became the uterus—an organ whose fibers, nerves, and vasculature provided a naturalistic explanation and justification for the social status of women.

The context for the articulation of two incommensurable sexes was, however, neither a theory of knowledge nor advances in scientific knowledge. The context was politics. There were endless new struggles for power and position in the enormously enlarged public sphere of the eighteenth and particularly the postrevolutionary nineteenth centuries: between and among men and women; between and among feminists and antifeminists. When, for many reasons, a preexisting transcendental order or time-immemorial custom became a less and less plausible justification for social relations, the battleground of gender roles shifted to nature, to biological sex. Distinct sexual anatomy was adduced to support or deny all manner of claims in a variety of specific social, economic, political, cultural, or erotic contexts. (The desire of male for female and female for male was natural—hence the new slogan "opposites attract"—or it was not.) Whatever the issue, the body became decisive.

But no one account of sexual difference triumphed. It may well be the case that almost as many people believed that women by nature were equal in passion to men as believed the opposite.[8] We simply do not know how many people believed, with the eighteenth-century moral anthropologist Pierre Roussel and the nineteenth-century English feminist Elizabeth Wolstenholme, that menstruation was a contingent pathology of civilization and how many believed the opposite, that menstruation showed the power of the uterus over women's lives and hence was a natural foundation for gender difference.[9] For everyone who thought that women of color were especially responsive sexually because of the structure of their genitalia, someone else thought that their coarse nervous systems and dry mucous membranes resulted in a "want of genital sensitiveness."[10]

Studies of the micropolitics of these alternative accounts would be rewarding, but we should not lose sight of the fact that the very terms of the debates are new: difference that had been expressed with reference to gender now came to be expressed with reference to sex, to biology. There were no books written before the late seventeenth century with titles like *De la femme sous ses rapports physiologiques, morals et littéraires* or *De la puberté . . . chez la femme, au point de vue physiologue, hygiènigue et medical* that argued so explicitly for the biological foundations of the moral order. There were hundreds if not thousands of such works in which sexual differences were articulated in the centuries that followed.

Scientists did far more than offer neutral data to ideologues. They lent their prestige to the whole enterprise; they discovered or bore witness to aspects of sexual difference that had been ignored. Moreover, the politics of gender very clearly affected not only the interpretation of clinical and laboratory data but also its production.[20] On the other hand, a number of new research traditions did produce considerable knowledge about the developmental and mature anatomy of the male and female body, about the nature of ovulation and the production of sperm, about conception, menstruation, and in the 1920s and 1930s the hormonal control of reproduction generally. By the early decades of this century, the power of science to predict and effect successful mating in humans and animals was considerably enhanced. In short, reproductive biology progressed in its understanding of sex and was not merely an "immature" enterprise that served competing social interests.

But my point here is that new knowledge about sex did not in any way entail the claims about sexual difference made in its name. No discovery or group of discoveries dictated the rise of a two-sex model, for precisely the same reasons that the anatomical discoveries of the Renaissance did not unseat the one-sex model: the nature of sexual difference is not susceptible to empirical testing. It is logically independent of biological facts because already embedded in the language of science, at least when applied to any culturally resonant construal of sexual difference, is the language of gender. In other words, all but the most circumscribed statements about sex are, from their inception, burdened with the cultural work done by these propositions. Despite the new epistemological status of nature as the bedrock of distinctions, and despite the accumulation of facts about sex, sexual difference in the centuries after the scientific revolution was no more stable than it had been before. Two incommensurable sexes were, and are, as much the products of culture as was, and is, the one-sex model.

In this chapter and the next I will primarily be making the negative

case that new scientific discoveries did not bring down the old model and enshrine the new. One sex, I want to emphasize again, did not die. But it met a powerful alternative: a biology of incommensurability in which the relationship between men and women was not inherently one of equality or inequality but rather of difference that required interpretation. Sex, in other words, replaced what we might call gender as a primary foundational category. Indeed, the framework in which the natural and the social could be clearly distinguished came into being.

Biological sex

In the late seventeenth and eighteenth centuries, science fleshed out, in terms acceptable to the new epistemology, the categories "male" and "female" as opposite and incommensurable biological sexes. One can sense this in subtle turns of phrase. Buffon, the encyclopedic Enlightenment naturalist, translates back and forth as if he senses that he is on the cusp of a momentous transformation: the peculiar correspondence between the parts of generation and the rest of the body might be called (with the ancients) "sympathy" or (with the moderns) "an unknown relation in the action of nerves."[11] A notion of order and coherence is replaced by corporeal wiring.

More generally, by the end of the seventeenth century the various intellectual currents that made up the transformation of human understanding known as the scientific revolution—Baconianism, Cartesian mechanism, empiricist epistemology, Newtonian synthesis—had radically undermined the whole Galenic mode of comprehending the body in relation to the cosmos.[12] This meant the abandonment, among other things, of the anatomical isomorphisms between man and woman and also the purging from scientific language of the old metaphors that had linked reproduction to other bodily functions, to the natural world, and to the great chain of being itself. Generation could now less plausibly be seen in terms of rennin and cheese; iron and loadstone lost their resonance as metaphors for semen and womb. The penis as plowshare and the womb as field did not quite capture Enlightenment views of fruitful intercourse. Hoary images drawn from agriculture—the vagina as an organ "inwardly wrinkled, like the inner skin of the upper jaw of a cow's mouth"—disappeared from works intended for a self-consciously sophisticated audience.[13] Indeed the term "generation" itself, which suggested the quotidian repetition of God's act of creation with all its attendant heat and light, gave way to the term "reproduction," which had less miraculous, more mechanistic connotations even if it did not quite capture the virtuosity of nature. As Fontanelle said, "Put a Dog Machine and a Bitch Machine side by side, and eventually a third little Machine will be the result, whereas two Watches will lie side by side all of their lives without ever producing a third Watch."[14] The importance in the eighteenth century of new theories of knowledge generally, and with respect to the body particularly, is a commonplace. Scientific race, for example—the notion that either by demonstrating the separate creation of various races (polygenesis) or by simply documenting difference, biology could account for differential status in the face of "natural equality"—developed at the same time and in response to the same sorts of pressures as scientific sex.[15] Claims of the sort that Negroes have stronger, coarser nerves than Europeans because they have smaller brains, and that these facts explain the inferiority of their culture, are parallel to those which held that the uterus naturally disposes women toward domesticity.[16] I want here simply to acknowledge that my particular story is part of what would be a more comprehensive history of exclusive biological categories in relation to culture.

Poullain de la Barre, one of the earliest writers in the new vein, illustrates the turn to biology when an old ordering of man and woman collapses. In his case the impetus to biology is twofold. In the first place de la Barre is committed to the Cartesian premise that the self is the thinking subject, the mind, and that it is radically not body. From this it follows that the mind, this decorporealized self, has no sex and indeed can have no sex. Gender, the social division between men and women, must therefore have its foundation in biology if it is to have any foundation at all. His version of Descartes' radical skepticism leads him to the same conclusion. He lists a number of views that the ignorant hold as unquestionable: that the sun moves around the earth; that traditional religion is true; that the inequality of man generally is evident in the "disparity of Estates and Conditions." And, "amongst these odd opinions," he writes, "there is not any mistake more Ancient, or Universal" than "the common Judgment which men make of the Difference of the two Sexes, and all that depends thereon"; ignorant and learned alike seem to think it "a paradox and piece of singularity" that woman might not be inferior to man in "capacity and worth."[17]

In other words, the usual views on sexual difference might simply be a mistake, like seeing a square tower as if it were round. It is not a Cartesian "clear and distinct" idea, as it would have been for Aristotle, but rather a question that can be decided on the same grounds as one judges whether the sun is the center of the solar system.[18] Given then that sexual difference is an empirical matter, even the most firmly held and seemingly secure views about women might turn out, upon further scrutiny, to be false. Moreover, de la Barre goes on, one can even demonstrate the precise, historically explicable causes of erroneous views: because the subject has been "but very lightly discoursed of"; because of "partiality"; because of the lack of "trial or examination." Once bias and superficiality have been dealt with, sexual difference is a question of biology that solely constitutes the category "sex." Specifically for de la Barre, the task is to demonstrate that the organic differences corresponding to the social categories of man and woman do not, or ought not to, matter in the public sphere. For others the project was quite the opposite. But whatever the political agenda, the strategy is the same: indeed, sex is everywhere precisely because the authority of gender has collapsed.[19]

Political theorists beginning with Hobbes had argued that there is no basis in nature, in divine law, or in a transcendent cosmic order for any specific sort of authority—of king over subject, of slaveholder over slave, or, it followed, of man over woman. For Hobbes, as for Locke, a person is essentially a sentient being, a sexless creature whose body is of no political relevance. Still, for both, males do end up being the head of households and nations. Men, not women, make the social contract. The reason for subordination, they want to hold, is not built into the world order; it does not arise from old-fashioned reasons like the superiority of spirit over matter or the historical dominance God granted Adam. Nor do they seem to want to attribute it to "mere nature," where a child would be more likely to obey its mother than its father. Instead it seems to have arisen in historical time as a consequence of a series of struggles that left women in the inferior position. Locke says simply that since "the last Determination, the Rule, should be placed somewhere, it naturally falls to the Man's share, *as the abler and the stronger.*"[20] In Hobbes it is much less clear, and one can only surmise that a woman's having a child puts her in a vulnerable situation, which allows the man to conquer her and her children and thereby create paternal rights by contract, by conquest in Hobbesian terms.[21] In any case he is adamant that paternal rights do not, as in the old model, arise from generation. However problematic, the tendency of early contract theory is to make the subordination of women to men a result of the operation of the *facts* of sexual difference, of their utilitarian implications. What matters is the superior strength of men or, more important, the frequent incapacity of women because of their reproductive functions.[22] Bodies in these accounts are not the sign of but the foundation for civil society.

Rousseau, arguing against Hobbes, takes a similarly biological tack. Hobbes, he says, erred in using the struggle of male animals for access to females as evidence for the natural combativeness of the primitive human state. True, he concedes, there is bitter competition among beasts for the opportunity to mate, but this is because for much of the year females refuse the male advances. Suppose they were to make themselves available only two months out of every twelve: "it is as if the population of females had been reduced by five-sixths." But women have no such periods of abstinence—love is "never seasonal" among the human species—and they are thus not in short supply; even among savages there are no "fixed periods of heat and exclusion" that produce in animals such "terrible moment[s] of universal passion."[23] Reproductive physiology and the nature of the menstrual cycle bear an enormous weight here, as the state of nature is conceptualized in terms of the supposed differences in the sexual receptivity of women and beasts.

And, to give a final example, Tocqueville argued that in the United States democracy had destroyed the old basis for patriarchal authority and that it was necessary to trace anew and with great precision "two clearly distinct lines of action for the two sexes."[24] In short, wherever boundaries were threatened or new ones erected, newly discovered fundamental sexual differences provided the material.

Their provenance was science. In the late eighteenth century, anatomists for the first time produced detailed illustrations of an explicitly female skeleton to document the fact that sexual difference was more than skin deep. Where before there had been only one basic structure, now there were two.[25] The nervous system assured, in still another realm, that the body "would be an observable and internally consistent field of signs," that female sympathy would be the result of female fibers.[26]

Gradually the genitals whose position had marked a body's place on a teleologically male ladder came to be rendered so as to display incommensurable difference. We can, already by the late seventeenth century, trace

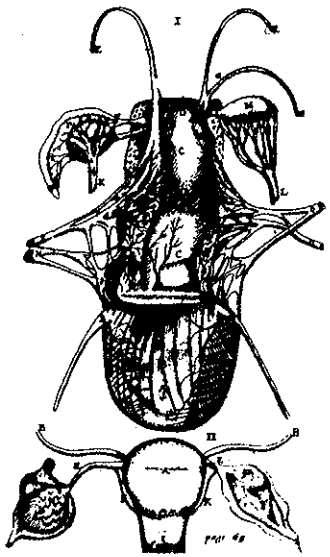


Fig. 51. The top drawing (I) shows a womb opened in relation to the "stones" and bladder. The lower drawing (II) shows the body of the uterus and the stones but, unlike earlier drawings, no vagina. From Bartholin, *Anatomy.*

the collapse of the old representations. Bartholin, who on occasion explicitly opposed the Galenic isomorphisms, produced in 1668 three separate drawings of the female genitalia: one that showed the whole generative system and pointedly left out the vagina and external pudenda; another that showed the womb open in relation to the "stones" (ovaries), again without a vagina; and finally one that showed the clitoris as a penis but rendered the vagina open so that it looked as little as possible like a penis (compare figs. 37 and 51). Even though these images belie the ancient construction of woman as an inferior, internalized man, their labels are still very much those of the old order: the "stones of woman" for the ovaries, the "deferent vessels" for the Fallopian tubes, the curiously metaphoric "sheath or scabbard of the womb" for what had been the neck of the womb and would become the vagina. Though the old representations were clearly no longer viable, genitals here were not yet doing the work of signification they would perform in the illustrations of the next century.

Just how shaky the new images still were is clear in the work of Regnier de Graaf (1641–1673). His discovery of the ovarian follicle provided the basis for much future discussion of sexual difference, but his illustrations of the female genitalia were more old-fashioned than Bartholin's. The

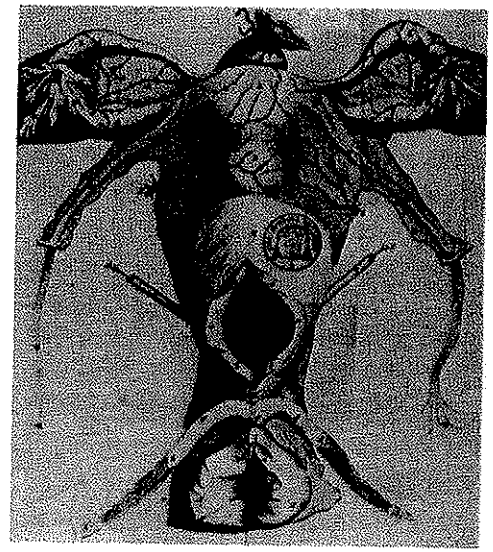


Fig. 52. The uterus, vagina, and ovaries—still labeled female testicles—from Regnier de Graaf, *De mulierum organis generationi inservientibus* (1672). If the vagina were not sectioned open, the picture would resemble earlier drawings produced to show the male and female organs as isomorphic.

entire vagina is still shown attached to the cervix, as in Renaissance texts, but de Graaf's depiction of the vagina opened just below the cervix and of the ovaries firmly attached to their ligaments tends to make the ensemble look considerably less penislike than its sixteenth- or early seventeenth-century counterparts (fig. 52).

By the late seventeenth century, the English anatomist William Cowper, like Bartholin, had separate drawings for the clitoris, for the pudendum and "fore part of the *vagina uteri,*" and for the uterus, ovaries, and Fallopian tubes. The only hints of the old formula are that he includes part of the vagina, albeit "divided so as to show its rouge," in his image of the uterus (thereby detracting from the penis effect) and that he has not quite adopted what would become modern nomenclature (figs. 53–54).

Indeed, "vagina" or equivalent words (*schiede, vagin*) standing alone to designate the sheath or hollow organ into which its *opposite,* the penis, fits during coition and through which the young are delivered only entered the European vernaculars around 1700. Other genital nomenclature also became more specific and laden with meaning. In a pornographic fantasy-travel book published in 1683, for example, the author describes a female-shaped island that had power over its male inhabitants through its

Figs. 53–54. The various parts of the female reproductive system and external genitalia are disaggregated. The vagina is opened so that it does not have the penislike effect of the closed organ shown in Renaissance illustrations. The clitoris, left top, is shown separately, and no effort is made to render the external pudenda as a female foreskin as before. On the right the uterus is shown in relation to the kidneys and their vasculature; the vagina is not shown. From William Cowper, *The Anatomy of Humane Bodies* (1697).

"soyl" and "mould" but definitely not through its sexual parts. Only the pregnant belly and what must be the urethra—it is never named—get specific references. But by the 1740s this erotic island is replete with the obvious modern genital landmarks: "the two forts called Lba"; "a metropolis called Cltrs."[27] Precisely during the intervening period, the hoary linguistic web in which words for womb and scrotum, penis and vagina, prepuce and vulva were entangled came unraveled. Whatever was there before, our forebears felt no need to name. Whatever came later is inseparable from the languages, largely scientific, through which it entered our subjectivity.

Organs that had been common to both sexes—the testicles—came as a result of the discovery of sperm and egg to have each its own name and to stand in synecdochal relationship to its respective sex. Sometime in the eighteenth century "testicle" could stand alone to designate unambiguously the male gonad; it no longer carries the modifiers "masculine" or "feminine." "Ovary," not "female stones" or "testicle feminine," came to designate its female equivalent. Moreover, the overtly political language of some earlier anatomical descriptions—Zacchia's description of a *beneficium* of the clitoris as leading to a false diagnosis of hermaphrodism, for example—gave way to the more clinical, organ-centered language of nineteenth-century medicine: "spurious" hermaphrodism due to "abnormal development or magnitude of the clitoris" reads a heading in one early nineteenth-century encyclopedia.[28]

The new relationship between generation and sexual pleasure, and hence the biological possibility of a passionless female, also had its origins in the late eighteenth century. In the 1770s the famous experimentalist Lazzaro Spallanzani succeeded in artificially inseminating a water spaniel, which suggested that in a dog, at least, orgasm was not necessary for conception.[29] Syringes could not "communicate or meet with joy," as a Scottish doctor observed.[30] (The surgeon John Hunter had earlier used a similar instrument to introduce the semen of a patient who suffered from a urethral defect into the vagina of the man's wife. But since the procedure took place after intercourse and with semen that had been ejaculated at the usual time, if not place, the experiment proved little about the role of female orgasm in conception.[31])

Pregnancy from rape provides the limiting case for a woman's conceiving without pleasure or desire. Samuel Farr, in the first legal-medicine text to be written in English (1785), argued that "without an excitation of lust, or enjoyment in the venereal act, no conception can probably take place."[32] Whatever a woman might claim to have felt or whatever resistance she might have put up, conception in itself betrayed desire or at least a sufficient measure of acquiescence for her to enjoy the venereal act. This is a very old argument. Soranus had said in second-century Rome that "if some women who were forced to have intercourse have conceived . . . the emotion of sexual appetite existed in them too, but was obscured by mental resolve," and no one before the second half of the eighteenth or early nineteenth century questioned the physiological basis of this judgment.[33] The 1756 edition of Burn's *Justice of the Peace,* the standard guide for English magistrates, cites authorities back to the *Institutes* of Justinian to

the effect that "a woman can not conceive unless she doth consent." It does, however, go on to point out that as a matter of law, if not of biology, this doctrine is dubious.[34] Another writer argued that pregnancy ought to be taken as proof of acquiescence since the fear, terror, and aversion that accompany a true rape would prevent an orgasm from occurring and thus make conception unlikely.[35]

In practice it is doubtful whether these views had much effect on courts of law.[36] To begin with, some legal authorities held that the maxim "it can be no rape, if woman conceive with child" seemed not to form a law.[37] Then, because of the difficulty in proving rape, and more generally the common law's leniency in matters of personal assault, only the most egregious and repugnant rapes ever came to trial: attacks on young girls or pregnant women, violations of mistresses by servants, cases in which venereal disease was transmitted or the victim mutilated.[38] In such instances the niceties of whether orgasm occurred were probably not relevant. Finally, the pregnancy defense was known not to be entirely reliable. One doctor argued in 1823 that conception was possible even when intercourse had been involuntary or with a man for whom the woman felt repugnance because both states may lead to "so high a tone of constitutional orgasm" as to make ovulation possible. The orgasm in question here—a turgescence of the reproductive organs—need not have been felt or desired for it to do its work.[39]

But by the 1820s the medical doctrines upon which legal definitions of rape were based had changed dramatically. The view that rape was incompatible with pregnancy was proclaimed in a much-cited text as "an extraordinary dictum of the ancient lawyers," a "vulgar idea, from which some ignorant persons might still infer that a woman had consented, because she was proven pregnant," thus adding unmerited stigma to the other burdens of the unfortunate victim of crime.[40] While the eighteenth-century edition of Burn quoted above was vague on the scientific question of whether conception ruled out rape, its nineteenth-century version stated unequivocally that the notion was absurd, that it would be surprising if "any whose education and intellect were superior to those of an old nurse" still believed it. Whatever the vulgar might have believed—and, as suggested earlier, ordinary people might very well have continued to subscribe in a deep, inarticulate way to old notions still widely circulating in books and gossip—the learned world firmly rejected the connection of female pleasure and conception. This does not mean that experts embraced the hypothesis, which remained controversial for another century, that women could ovulate independently of intercourse. The point is rather that women could experience the tension of sexual intercourse and even orgasm, in the nineteenth-century sense of the word as a turgescence or pressure, without any concomitant sensation. The ovarian system, in other words, could work not only without the influence of the conscious self but without any phenomenal sign. "Physical constraint . . . sufficient to induce the required state" was all the ovaries needed.[41]

Even in the late eighteenth century, some writers had said that there was no relationship between the erogenous qualities of the external female genitalia and the serious work that went on within. One argued that the "lascivious susceptibility" of the external organs was materially useless to generation; another noted the "organization of the vagina for the purpose of exciting titillation and pleasure" only to follow this observation with the non sequitur that "it can and does accommodate itself to whatever size is necessary closely to embrace the penis in the act of copulation."[42] A major obstetrics textbook remarked casually that it would not dwell on the clitoris and other external organs because they were irrelevant to midwifery.[43] So, even if doctors in these and many similar texts did not directly address the question of whether women had sexual feelings or experienced orgasm, they considered these sensations as contingent to the order of things. No longer necessary for conception, they became something that women might or might not have, something to be doggedly and inconclusively debated rather than, as had been the case for so long, taken for granted.

And we must not take for granted the terms in which science defined the new sexes. It claimed that the body provided a solid foundation, a causal locus, of the meaning of male or female. The trouble here lies not with the empirical truth or falsity of specific biological views but with the interpretive strategy itself. Sexual difference no more followed from anatomy after the scientific revolution than it did in the world of one sex.

The aporia of biology

The aesthetics of anatomical difference. Anatomy, and nature as we know it more generally, is obviously not pure fact, unadulterated by thought or convention, but rather a richly complicated construction based not only on observation, and on a variety of social and cultural constraints on the

practice of science, but on an aesthetics of representation as well. Far from being the foundations for gender, the male and female bodies in eighteenth- and nineteenth-century anatomy books are themselves artifacts whose production is part of the history of their epoch.

This is not to say, as we have seen in Chapter 3, that an anatomy text or illustration cannot be judged more or less accurate. There is progress in anatomy. There are bounds to the scientific imagination. Vesalius *was* wrong in depicting the *rete mirabele* in humans, although his eagerness to see it is understandable within the context of Galenic physiology. There are normally no holes in the septum of the heart as Renaissance anatomists thought, although again it is not difficult to see how a patent *foramen ovales,* present in a quarter of cases, and the myriad spaces between the *trabeculae carneae* that anchor the valves might not be mistaken for vents between the right and left sides. The ovaries *are* structurally dissimilar from the testicles, although not so much in their gross surface appearance as the early texts would have it.

But all anatomical illustrations, historical and contemporary, are abstractions; they are maps to a bewildering and infinitely varied reality. Representations of features that pertain especially to male or female, because of the enormous social consequences of these distinctions, are most obviously dictated by art and culture. Like maps, anatomical illustrations focus attention on a particular feature or on a particular set of spatial relationships. To fulfill their function they assume a point of view—they include some structures and exclude others; they strip away the plenum of sheer stuff that fills up the body—fat, connective tissue, and "insignificant variations" that are not dignified with names or individual identities. They situate the body in relation to death, or to this world, or to an identifiable face—or, as in most modern texts, they do not. As figs. 10–16 suggest, the social situation of cadavers was once far richer and more varied than it became in the nineteenth century. The compilers of anatomical texts use or eschew various techniques of the engraver or painter to gain specific effects. Anatomical illustrations, in short, are representations of historically specific understandings of the human body and its place in creation and not only of a particular state of knowledge about its structures.

Thus, for example, figs. 20–26, which make the vagina look like the penis, are not incorrect because they emphasize a relationship between the female reproductive organs that anatomists since the late seventeenth

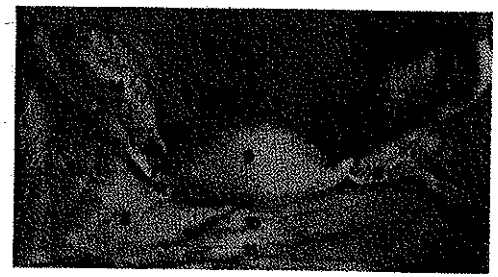
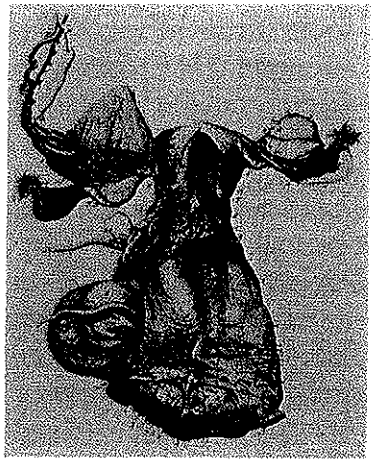
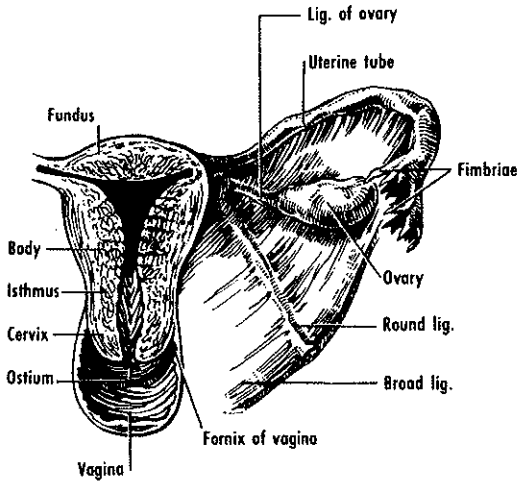


Fig. 55. Photograph of the uterus and ovaries from above, using embalmed material.

century have chosen to deemphasize; nor conversely are eighteenth-century illustrations (figs. 51–54) more correct because they do not emphasize this relationship. One could (figs. 28–29) produce a Renaissance look-alike from modern plates.

But the extent of interpretation inherent in any anatomical illustration is evident in less controversial contexts. Consider, for example, fig. 55, a photograph of the uterus and ovaries from above and in front. It is in no sense "ideological," but it is enormously selective. There is no blood or other fluid in the picture; most of the fat and connective tissue has been stripped away; the body in which the organ resided is scarcely in evidence; the tone is cool and neutral. Contrast this to two drawings of the same subject. The first (fig. 56), prepared to illustrate what was wrongly believed to be a human egg, looks almost like a Caspar David Friedrich landscape. Shaded valleys furrow the broad ligaments of the uterus; the trumpets of the Fallopian tubes look like exotic flowers growing out of a bank of billowing clouds. The second (fig. 57) is from a modern text and is in the tradition of schematic, almost architectural drawing introduced by the great German anatomist Jacob Henle, to show only particular features of an organ, salient for the occasion. There is almost no shading or sense of texture; the tone, as in the photograph, is detached and scientific; no affect mars its supposed objectivity; there is no sense of its being the organ of an individual. The final illustration of the same organ (fig. 58) operates at an even greater level of abstraction. Here is a blueprint, drawn to show a specific feature of the structure in question with no effort to situate it further, as if the organ were a machine. I do not want to maintain that these pictures are ideological in that they overtly distort observation in the interest of one political position or another. I simply want





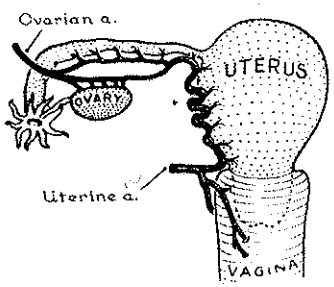


Fig. 56. (above, left) A richly textured drawing of the uterus, Fallopian tubes, and ovaries from an 1817 issue of *Philosophical Transactions* (no. 107). Note the way structures seem to flap in the wind and how shading creates a dramatic effect.

Fig. 57. (above, right) A modern, considerably less elaborated, and more abstract drawing of the structures seen in fig. 56.

Fig. 58. (left) A modern schematic drawing of the uterus, ovaries, and Fallopian tubes.

to point out what is already well established in the criticism of high art: pictures are the product of the social activity of picture making and bear the complex marks of their origins.

Still, anatomical illustrations that claim canonical status, that announce themselves to represent *the* human eye or *the* female skeleton, are more directly implicated in the culture producing them. Idealist anatomy, like idealism generally, must postulate a transcendent norm. But there is obviously no canonical eye, muscle, or skeleton, and therefore any representation making this claim does so on the basis of certain culturally and historically specific notions of what is ideal, what best illustrates the true nature of the object in question. Some texts, like the enormously successful Gray's *Anatomy,* blithely and unselfconsciously represent the general case of every feature as male. All the surface anatomy is demonstrated by male, though curiously unmuscular, subjects and thereby belies whatever objective claim one might want to make for the advantages of the male body in illustrating surface articulations. Even the schematically drawn cleavage lines that divide thorax from abdomen and the markings to show the course of blood vessels are shown on a male model; the hands in various stages of dissection are all male hands; the distribution of cutaneous nerves are shown on the schematic drawing of a man. It is simply assumed that the human body is male. The female body is presented only to show how it differs from the male.[44]

Samuel Thomas von Soemmerring, who produced one of two competing canonical illustrations of the female skeleton in the nineteenth century, was more straightforward in articulating his principles of selection. The anatomically normal was for him, as for much anatomy in the idealist tradition, the most beautiful. An anatomist was thus engaged in the same deeply serious task as a painter: to render the human form, and nature generally, in accord with the canons of art. In his comment on his illustration of the eye, Soemmerring argues:

> Just as, on the one hand, we assume that all works of art representing the human body and claiming ideal beauty for themselves must needs be correct from an anatomic point of view, so, on the other hand, should we as readily expect that everything that the dissector describes anatomically as a normal structure must needs be exceptionally beautiful.[45]

Like the distinguished anatomist Bernard Albinus, who counseled his colleagues to be like artists who "draw a handsome face, and if there happens to be a blemish in it, they mend it in the picture," Soemmerring promised to avoid anything in his representations that was "distorted, dried, shriveled, torn or dislocated."[46] Anything that failed to meet the highest aesthetic standards was banished from his representations of the body; the grand tradition of Sir Joshua Reynolds' prescriptions to painters in his *Discourses* was mirrored in the seemingly alien world of scientific illustration.

Soemmerring was dissatisfied with the d'Arconville/Sue female skeleton, the only alternative available in the 1790s, and set to construct an alternative based on the highest standards of observation and aesthetic judgment. Finding no skeleton in his collection suitable, he acquired one of a twenty-year-old girl of proven femininity (she had given birth); to

this skeleton he apparently appended the well-known skull, from Johann Friedrich Blumenbach's collection, of a Georgian woman. He then went to great lengths to determine the appropriate pose, seeking the advice of artists and connoisseurs; he posed live models; and eventually he compared his product with the Venus de Medici and the Venus of Dresden. The canonical skeleton had to seem plausible as the foundation of the canonical female form.

All of this bears an uncanny resemblance to Alberti's account of the Athenian painter Xeuxis (fifth century B.C.):

> He thought that he would not be able to find so much beauty as he was looking for in a single body, since it was not given to a single one by nature. He chose, therefore, the five most beautiful young girls from the youth of the land in order to draw from them whatever beauty is praised in women. He was a wise painter.[47]

Thus the making of *the* female skeleton, or indeed of any ideal representation, is an exercise in a culturally bound aesthetic. And, as it happened, Soemmerring's beauty failed to meet the political standards of its day; the d'Arconville/Sue skeleton triumphed. Why? According to the Scots anatomist John Barclay, "although it is more graceful and elegant and suggested by men of eminence in modelling, sculpture and painting, it contributes nothing to the comparison which is intended."[48] The missed comparison of course was between men and women, and the specific mistake of which Soemmerring stood accused was his failure to represent with sufficient specificity the female pelvis, the most significant sign in the bones of sexual difference. To be sure that his readers fully comprehended the point, Barclay reproduced Albinus' male skeleton with George Stubbs's rendering of the musculature of a horse in the background and the Sue skeleton of the female with a skeletal ostrich looking on.[49] The iconography of the horse was transparent in a world in which the beast was bred for its speed, power, and endurance, in which a man on horseback still represented authority. The ostrich was a less usual sign, but it too must have been readable. Its enormous pelvis in proportion to its body directs the viewer's attention to the analogous feature in the accompanying human female, and its long neck must have been an allusion to the claim of phrenology that the characteristically long neck of women bore witness to their low "amativeness," their lack of passion.

Anatomical science was thus itself the arena in which representation of sexual difference fought for ascendancy. The manifest anatomical differences between the sexes, the body outside of culture, is known only through highly developed, culturally and historically bound paradigms, both scientific and aesthetic. The notion that scientific advance alone, pure anatomical discovery, could account for the extraordinary late eighteenth- and nineteenth-century interest in sexual dimorphism is not simply empirically wrong—it is philosophically misguided.

Embryogenesis and the Galenic homologies. A stranger surveying the landscape of mid-nineteenth-century science might well suspect that incommensurable sexual difference was created despite, not because of, new discoveries. Careful studies of fetal development would give credence not to new differences but to old androgynies, grounded this time not in myth or metaphysics but in nature. It had been known since the eighteenth century, for example, that the clitoris and the penis were of similar embryological origin. An early nineteenth-century textbook on forensic medicine, in a section on hermaphrodism and the difficulties of telling the sex of newborns, points out that at birth the clitoris "is often larger than the penis, and has frequently given rise to mistakes." The writer cites the *Memoirs de l'Academy Royal des Sciences de Paris* for 1767 to the effect that the seemingly disproportionate number of male miscarriages in the third and fourth months is due to the size of the clitoris in female embryos and the resulting confusion of sexual identification. (The error is understandable, as fig. 59 suggests.) More generally the triumph in embryology, during the first thirty years of the nineteenth century, of epigenesis (the view that complicated organic structures arise from simpler undifferentiated ones rather than from preformed entities inherent in the sperm or the egg) would seem to undermine root and branch difference. Science revealed an embryo in which the Wolffian duct, named after Kaspar Friedrich Wolff, was destined to become the male genital tract, and the Mullerian ducts, after Johannes Müller, would become the Fallopian tubes and the ovaries. Until about the eighth week, the two structures coexist. Furthermore, it was known by the middle of the nineteenth century that the penis and the clitoris, the labia and the scrotum, the ovary and the testes, begin from one and the same embryonic structure. The scrotal sac, for example, is a modification of the labia majora, a version of the embryonic labiscrotal swelling in which the lips grow longer, fold over, and join along the scrotal raphe.[50] Here, even more powerfully than

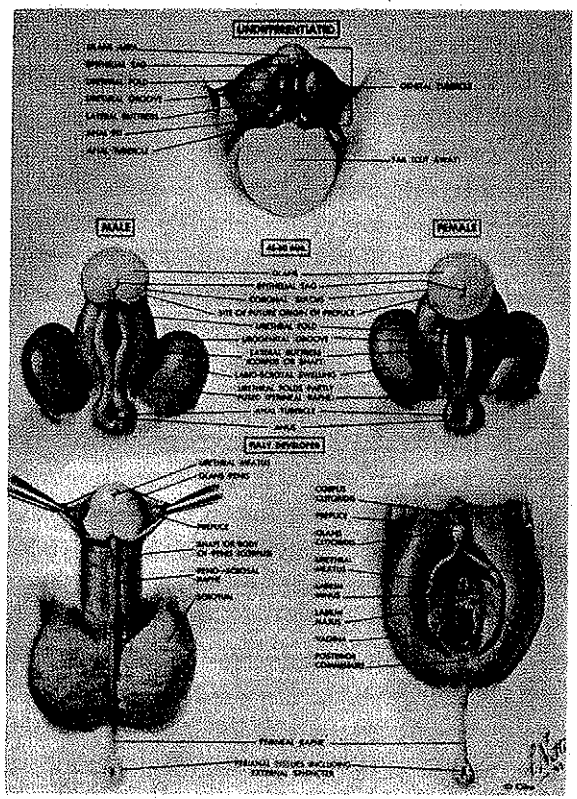


Fig. 59. At 40–55 mm in length, around two and a half months into gestation, the male and female genitalia are almost indistinguishable. Gradually, after the third or fourth month, it become easier to tell the sexes apart. Drawing by Frank Netter, *CIBA Collection of Medical Illustrations*.

in the early coexisting two ducts, the old Galenic homologies seem to find new resonance. Modern representations of the development of the external genitalia bear a remarkable resemblance to Vesalius' or Leonardo's illustrations, and modern charts of genital embryology seem faithfully to reproduce Galen's lecture on woman as inverted male.

Moreover, the idea of common embryological origins of various male and female organs, in the very different political climate of the 1980s, has engendered a modern version of ancient thought. One psychoanalyst in an effort to rehabilitate the vagina for its erotic and indeed erectile functions, after two decades of what he calls "clitorocentricity," marshals considerable evidence for the homology of male and female ejaculation. There are, he says, immunohistochemical homologies between the secretions of the male prostate and the female paraurethral glands, structures whose common roots in the embryonic urogenital sinus have been known since the nineteenth century. In fact, as he points out, the secretory glands that empty into the female urethra were known as prostates in both sexes until in 1880 they took the name of A. J. C. Skene, who extensively investigated them.[51] Thus a vast scientific literature—indeed, embryological investigation was the glory of nineteenth-century descriptive biology—provided a great repertory of new discoveries, which, far from destroying old homologies, could well have strengthened them. My point, however, is not to argue that scientific advances did somehow give greater credence to the ancient model. New cultural imperatives of interpretation simply had a larger field out of which to construct, or not construct, a biology of sexual difference.

Sperm and egg. The claim by Harvey in 1651 that all life comes from an egg; the subsequent announcement by de Graaf in 1672 that he had discovered the ovarian follicle that was thought to be, or to contain, that egg; and the revelation by Leuwenhoek and Hartsoeker, also in the 1670s, that semen contained millions of little animalcules: all this seemed to provide, in the microscopic generative products, an imaginatively convincing synecdoche for two sexes. The vaginal secretions that had for millennia been taken to be a thin, cooler, less perfect version of the male ejaculate turned out to be something entirely different: "since the discovery of the egg . . . that Liquor which has been taken by all preceding Ages for the Seed in [women], is found to be only a mucous Matter, Secreted from the Glands of the *Vagina*." For a time it seemed, in fact, that the newly discovered egg would detract "much from the dignity of the Male sex" since it "furnish'd the matter of the Fetus," while the male only "actuated it." But then Anton van Leuwenhoek discovered that the male ejaculate was not just a thick liquid seed: "by the help of his Exquisite microscope . . . [he] detected Innumerable small Animals in the Masculine sperm, and by this Noble Discovery, at once removed that Difficulty."[52] Sperm and egg could now stand for man and woman; male dignity was restored.

Social sex thus projected downward into biological sex at the level of the microscopic generative products themselves. Very quickly the egg

came to be seen as a merely passive nest or trough where the boy or girl person, compressed in each animalcule, was fattened up before birth. Fertilization became a miniaturized version of monogamous marriage, where the animalcule/husband managed to get through the single opening of the egg/wife, which then closed and "did not allow another worm to enter."[53] In other words, old distinctions of gender now found their basis in the supposed facts of life.

Moreover, the discoveries of egg and sperm marked the beginning of a long research program to find sexual reproduction everywhere.[54] For a time it succeeded in doing just that. Whether one believed that the egg or the sperm contained the new life already preformed, or that each contributed elements toward the epigenetic development of succeeding generations, sexual reproduction and the nature of sexual difference dominated thinking about generation.[55]

Very quickly sex also filtered down from animals to plants. The pistil, a word from the Latin *pistillium* (pestle), became an unlikely name for the seed-bearing ovary. The stamen—actually the anther at its end—from which the pollen emanates, became the botanical penis. Instantly plants were gendered, and sex was assimilated to culture: "hence it seems rational to denote these apices by a more noble name and attribute to them the importance of masculine sexual organs; it is there that the semen, the powder that constitutes the subtlest part of the plant, accumulates, and it is from there that it later flows forth."[56] The sexual nature of plants became the basis for Linnaeus' famous classificatory system. Further investigation found sexual products up and down the living world; beginning in the 1830s spermatozoa, for example, were located in every invertebrate group except Infusoria. The *Naturphilosophen* thus seemed to be right in viewing sexual difference as one of the fundamental dichotomies of nature, an unbridgeable chasm born not of the Pythagorean opposites but of the reproductive germs themselves and the organs that produced them.

As it turned out, however, the new discoveries were of only fitful utility. In the first place, the immediate, promiscuous projection of gender onto sex in Linnaeus' sexual system made even contemporaries blush. The group of plants classed as Monoecia, meaning "one house," took its name and character from the fact that "Husbands live with their wives in the same house, but have different beds [leaves]." The class Polygamia aequalis meaning "equal polygamy," was seen to "consist of many marriages with promiscuous intercourse."[57] Plant sex was so extremely gendered at its core that in his own day Linnaeus' taxonomy seemed quite indecent.

Furthermore, even in humans and other creatures in which egg and sperm were understood to be the distinct products of different sexes, the meanings of the terms were in constant flux. There was, in other words, no consensus as to what sperm and egg actually were or did, until the turn of the nineteenth century.[58] The synecdochic imagination was thus unfettered by the supposed discovery of distinctive generative products; the incommensurability of the sexes rested uneasily on microscopic bodies whose significance was much debated. Preformationists were unevenly divided between a majority who were ovists and a minority of animalculists. The choice between them was often ideological: among the main arguments against the animalculists was that God would never have devised so profligate a system that millions of preformed humans had to die in each ejaculation so that one might, on occasion, find food for growth in the egg. Insofar as observation had anything to do with theory—Haller, for example, was in part converted to preformationism and particularly to ovism because he thought that he could trace the continuity of the membranes of a chick embryo's intestines from the membranes of the yolk sac—gender played little role.[59]

So, even if some contemporaries spoke of the respective dignities of male and female being reflected in the two respective preformationist theories, the debate was really on different grounds. And in fact neither ovism nor animalculism suggested a world of two sexes but rather a world of no sex at all. Both bespoke parthenogenic reproduction: either the egg contained the new life and the sperm was just a living version of the glass rod that could make frog eggs develop on their own, or the sperm contained the new life and the egg was just a food basket. Technical developments in the explosively developing study of generation also undermined the supposed ubiquity of sexual reproduction. Charles Bonnet's proof in 1745 that aphids reproduced by parthenogenesis—a term coined by the great comparative anatomist Richard Owen in 1849—was the first step in finding that the development of unfertilized eggs from sexually mature females was far more widespread than had been thought possible. Abraham Trembley's demonstration, at about the same time, of the regenerative powers of hydra had general repercussions in discussions not only of sexuality but of generation at the theoretical level. Other developments and tendencies—the discovery of alternation of generations

in 1842 and the increasing interest in hermaphroditic reproduction—also tended to push eighteenth-century models of universal sexual reproduction, insofar as such models existed, to the sidelines.[60]

I do not want to rehearse the long history of sperm-or-egg but only to point out that the gender claims made on their behalf were constantly being undermined by these sorts of controversies.[61] Until the 1850s it was unclear whether sperm merely stirred the semen—a wormlike mixmaster—stimulated ovulation, touched the egg, or actually penetrated it. The conceptual triumph of cell theory and advances in microscopy and staining finally allowed Oskar Hertwig, in 1876, to demonstrate that the sperm did indeed penetrate the egg and that the actual joining of the egg and sperm nuclei *was* fertilization. (As I said, this seemed to provide an unassailable microscopic model for incommensurable sexual difference, until a move to the molecular, DNA level made it all less clear again.) Well into the twentieth century, the debate continued on whether all or only some of the nuclear material blended.

For much of the period under discussion here, the role and nature of the sperm remained obscure. Spallanzani had proven in the late eighteenth century that no amount of vapor from semen would fertilize frog eggs, that Harvey's *aura seminalis* was insufficient to cause the female mold to produce tadpoles, and that increasing filtrations of semen eventually rendered it impotent. He showed that naked male frogs mounting a female fertilized her eggs but that frogs wearing little taffeta trousers did not; he went on to demonstrate, furthermore, that the residue on their ludicrous garb was potent. (He had previously shown—by killing a female frog in the act of copulation and noting that the eggs still inside her did not develop while those that had been in contact with the sperm were fertile—that the eggs were fertilized outside the body.) Despite all of this, he continued to think that the little creatures in semen were mere parasites and that semen worked by stimulating the heart of a preformed fetus released from the ovary after fertilization.[62]

The debate between preformationists—ovists or animalculists—on the one hand and epigenesists on the other provides further evidence for just how irrelevant research on germ substances was to thinking about two sexes. The choice between preformation and epigenesis was made on philosophical rather than empirical grounds, but quarrels about gender played no part. Albrecht von Haller differed from Christian Woolf not on the interpretation of this or that piece of data—indeed they generally talked right by each other—but on basic issues in the philosophy of science: a mechanistic, Newtonian preformationism in which embryological development works out God's plan as against a rationalist, somewhat more vitalist epigenesis in which matter was not merely inert substance to be worked upon by God's laws.

Among epigenesists, a major figure like Buffon could still write in the cadences of the old biology of generation, as if nothing had happened, almost a century after the discovery of sperm and egg: "the female has a seminal liquor which commences to be formed in the testicles" and that "the seminal liquors are both [male and female] extracts from all parts of the body, and in the mixture of them there is everything necessary to form a certain number of males and females." The point is not that Buffon was wrong in his theories of pangenesis or right, for the wrong reasons, that there is a "moule intérieur" in the particles of male and female "semen" which organize matter into organic structures.[63] Rather I want to suggest that in the eighteenth and nineteenth centuries, and indeed today, at any given point of scientific knowledge a wide variety of contradictory cultural claims about sexual difference are possible. Pierre de Maupertuis, one of the major opponents of preformationism—he believed that atoms arranged one another according to some plan—in 1756 was still writing, as had Democritus in ancient Greece, about orgasm: "it is that moment, so rich in delight, which brings to life a new being."[64] Neither the level of scientific knowledge nor its "correctness" restrains the poetry written in its name.

But even if Maupertuis or other eighteenth- and nineteenth-century scientists had arrived at what we consider to be the correct interpretation of the data at hand, observation and experiment would still not have created a metaphor for maleness or femaleness. Translating facts about reproduction into "facts" about sexual difference is precisely the cultural sleight of hand I want to expose.

The ovary and the nature of woman. The most egregious instance of anatomical aporia, and the clearest case in which cultural assumptions fueled a research tradition whose results in turn confirmed those views, involved the ovary. "Propter solum ovarium mulier est id quod est" (it is only because of the ovary that woman is what she is), wrote the French physician Achille Chereau in 1844, forty years before there would be any evidence for the real importance of the organ in a woman's life. Here is a