The Nature of Nature in Early Modern Europe

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Introduction: What Was Modern about the Early Modern?

The very term “early modern” implies a historical doctrine of preformationism: whatever characterizes modernity was somehow present in embryo—tiny but recognizable—in the period from circa 1500 to 1789. “Early modern” is as screamingly anachronistic and teleological a label as “the Middle Ages”; yet even a generation of historians trained to revile anachronism and teleology as cardinal sins still clings not only to the letter but also to the spirit of the term. The most provocative recent works of cultural, intellectual, social, economic, and political history locate the origins of the modern state, modern capitalism, the modern mind, the modern individual, and, of course, modern science in this pivotal period. The history of science has long underwritten, and continues to underwrite, the validity of the periodization “early modern” by singling out much the same chronological territory with its own portentous label, “the Scientific Revolution.” [. . . ] Like the preformationist fantasy of uncountably many human generations nested
one within another in the womb of Eve, all that is modern, from secularization to commodity capitalism to scientific experiment, is imagined to lie curled within the fertile and capacious womb of the early modern.

Mythologies, especially origin mythologies, are notoriously deep-rooted and resilient. [. . .] Myths are tenacious because they defy the too-simple logic of true versus false. They are typically false in all their details, and true in their essences. I cherish no illusions about the efficacy of empirical counterexamples, or rational argument, or even ridicule to loosen the hold of such mythologies on the collective imagination of historians. Rather, I want to examine the most powerful variant of the myth of the early modern pregnant with the modern, the variant that has elevated the Scientific Revolution to epoch-making significance not only in the narratives of the history of science, but also in the grander (and usually gloomier) narratives of cultural critics, from Max Weber to Theodor Adorno and Max Horkheimer to Michel Foucault. This is the myth of the disenchantment of nature, here summarized in bare-bones version.

Sometime between the mid-sixteenth and the mid-eighteenth centuries, so runs the myth, nature lost its soul. No longer animated nor active, nature was reduced to brute, passive, stupid matter. The Scientific Revolution transformed creative nature into a machine, blindly obedient to cause and effect. But as nature’s IQ plummeted, its authority soared. Nature replaced God as the ultimate basis for legitimation: natural law warranted the social and political orders, natural desires justified the expansion and deregulation of commerce, natural theology proved the existence and benevolence of the
deity. Mythologists in this tradition resolve the apparent paradox of nature's simultaneous fall and rise by pointing to the cultural logic of naturalization. Nature's authority in hotly contested social and political matters such as the subordination of wives to husbands or the subordination of subjects to monarchs or the subordination of infidels to established religion depends on the claim that nature is a neutral party to such strife. And what is more neutral than a stupid machine? The very enslavement of nature to a metaphysics of regularity, necessity, and uniformity recommended it as an arbiter: blind, impartial, inexorable—a new allegory of blindfolded Justice brandishing an unsheathed sword.

This is of course a stick-figure caricature of the nuanced, eloquent, and vigorously argued narrative of disenchantment. It is a mythology that admits of more variations than a fugue. [ . . . ] But whether optimistic or pessimistic, all of these narratives agree on the core myth: the Scientific Revolution wrought profound changes in the European understanding of nature, changes that reverberated to the very depths of culture and society. In these sagas of modernity and Enlightenment, the Scientific Revolution is the unmoved mover that sets the irreversible processes of secularization, industrialization, and rationalization in motion. The "nature" of victorious natural philosophy secures political rights, enforces gender complementarity, erodes revealed religion, submits to economic exploitation, and in general anchors the social order. Within the mythology of disenchantment, if the early modern gave birth to the modern, then the new nature of the Scientific Revolution served as midwife.
This grand cultural narrative intersects with the current historiography of science at two important points. The first is the feminist account of how the gendering of nature in the seventeenth and eighteenth centuries promoted its technological and ideological exploitation, and reinforced cultural constructions of gender.¹ In terms of the disenchantment narrative, the feminist historiography corresponds roughly to claims about the personification and depersonification of nature, and often echoes the antimodern undertone of the cultural critics—although the feminist interpretations are developed in a political direction and in a fine-grained detail that have no precedent in the disenchantment tradition. The second point of intersection is the discourse of legitimation that weaves so thickly through some of the most original recent works on the Scientific Revolution.² Borrowing arguments from sociology, Wittgensteinian philosophy, and cultural history, these historians of science challenge the self-evidence of experiment, matters of fact, mathematical models, and other celebrated innovations of the Scientific Revolution. They do not deny the novelty or the significance of these scientific practices—on the contrary—but they insist upon their historical contingency. Strong argu-

ments could be, and were, brought against all of these innovations by contemporaries. And more was at stake than just natural philosophy: in these accounts, the Medici regime, the Jesuit order, the Restoration polity, and the absolutist monarchy of Louis XIV all drew upon and themselves buttressed the authority of new ways of studying and describing nature. The crisis of religious, political, and social authority that roiled early modern Europe swept up science as well.

Hence the centrality of legitimation in the recent historiography of the Scientific Revolution, which contends that in an age of religious heresy, political rebellion, social insubordination, and philosophical skepticism, nothing could be taken for granted, not even facts and mathematics. The new philosophers of nature were at once borrowers and lenders in a vertiginous exchange of cultural credit. Ultimately—and here is where the new historiography of the Scientific Revolution coincides with the old mythology of disenchchantment—nature became the bank that backed all such drafts on legitimacy. In the denouement of the early eighteenth century, monarchs ruled by natural law rather than by divine right; established religion proved its doctrines by natural philosophy and natural history, rather than by revelation; great natural philosophers were honored alongside great statesmen with gravestones in Westminster Abbey.

My aim in this paper is to address two questions raised by the intersection of the grand narrative of disenchantment with the new historiography of the Scientific Revolution. First, if nature wielded cultural authority in early modern Europe, what were the

sources (and limits) of that authority? What were the meanings and values of nature for the learned and the powerful during this period? Second, what is the logic (and psychology) of the historical argument for the centrality of legitimation to the Scientific Revolution? Does this argument square with the resources that early modern views of nature actually supplied? These themes [. . . ] are so deeply embedded in what we understand by the modern that we assume that they must originate in the early modern. But preformationism was and remains a dubious doctrine.

**The Natural and the Non-Natural**

Supernatural, preternatural, artificial, unnatural—these were the forms of the non-natural that bounded and defined the natural for early modern Europeans. Moderns oppose different complements to the natural: nature versus nurture, nature versus culture—this last a word that early moderns seldom applied to anything except the cultivation of the land. [. . . ] The contrast between early modern and modern versions of the non-natural is striking. In the current metaphysical vernacular, the artificial has been swallowed up by the natural, the supernatural has shrunk to a philosophical possibility, the unnatural rings archaic, and the preternatural no longer exists at all. To reconstruct the meanings and resonances of early modern nature requires setting aside the modern opposition of nature versus culture and making a brief tour of the older oppositions. In this section I first briefly survey the core meanings of each form of the non-natural as they crystallized in the period from the thirteenth through the early sixteenth century,
before describing the most striking changes wrought in the sixteenth through early eighteenth centuries.

As a realm clearly opposed to the natural, the supernatural was the invention of thirteenth-century theologians, most notably Thomas Aquinas. Augustinian nature had mirrored the will of God; hence all of nature was a miracle, and nothing was contrary to nature: “For how can anything done by the will of God be contrary to nature, when the will of so great a creator constitutes the nature of each created thing?”  

Aquinas, in contrast, treated miracles within an Aristotelian framework that emphasized the order and semi-autonomy of nature. According to Aquinas, God’s miracles violate only the lower order of causes, which exist only by God’s will, leaving the higher order of causes, which depend on necessity, intact. Miracles are God’s unmediated interventions in the natural order, and hence “above nature.”

This ontological doctrine of the supernatural was much complicated by medieval religious practices, which blended together scriptural and sacramental miracles, the miracles of God with those of saints and their relics, the historical miracles recorded in chronicles and the judicial miracles of trials by ordeal. Finally, despite strenuous philosophical and theological attempts to distinguish the two categories, miracles and marvels—the supernatural and the preternatural—also blurred together.

Aquinas had been quite clear about the boundary between the supernatural

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and the preternatural ("beyond nature"). Whereas, according to Aquinas, only God could work miracles, demons, angels, human magicians, and nature itself could produce marvels by the adroit manipulation or rare conjunction of natural causes and properties: “For the order imposed on things by God is in keeping with that which is wont to occur in things for the most part, but is not in keeping with what always occurs: because many natural causes produce their effects in the same way usually, but not always; since sometimes, though seldom, it happens otherwise, ... as when nature produces a sixth finger in a man.”⁵ In addition to monsters, the preternatural embraced strange weather, figured stones, petrifying springs, the occult virtues of plants and minerals, and myriad other deviations from the ordinary course of nature. Marvels were not so much violations of as exceptions to the natural order. Even the wonders fabricated by demons did not surpass the powers of nature, any more than did the works of the skilled human craftsman. As Thomas Browne said of Satan: “Besides, being a naturall Magician he may performe many acts in wayes above our knowledge, though not transcending our naturall power, when our knowledge shall direct it.”⁶ Early modern theologians, magistrates, and physicians urgently attempted to discern the boundaries between the supernatural, preternatural, and natural: on the one hand, religious polemicists battled over how to distinguish genuine miracles from demonic counterfeits; on the other, judges in witchcraft trials enlisted theologians and, especially, physicians to distinguish between natural oddities and sorcery.

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Like the supernatural and the preternatural, the artificial was an ontological category: in Aristotle’s formulation, still cited well into the seventeenth century, only natural objects have “an innate impulse to change,” in the extended Aristotelian sense of achieving a *telos*. Artifacts lack ontological identity, the “nature” that would stamp them as one kind of thing rather than another. Art might imitate, perfect, help, or even improve nature, as the medieval and early modern commonplaces had it, but art could never create a “nature,” in the sense of an inner essence that defined an authentic kind or species. Oak trees constituted a natural kind, but the beds and tables made from them did not. This ontological criterion outweighed that of agency: human art and nature might produce similar effects by similar procedures, but art could not create or alter essences. During the sixteenth and seventeenth centuries, the art/nature opposition was attacked on several fronts—aesthetic, philosophical, and artisanal—but the intellectual and practical reflex of classifying objects as one or the other persisted.

Even the moral category of the unnatural, which designated heinous crimes like patricide and bestiality, had ontological underpinnings. Unnatural vices like incest or bestiality transgressed a divinely established natural order. Hence Aquinas rebutted the argument that adultery ought to count as a graver sin than bestiality, since persons are injured in the one case but not in the other, on the grounds that “in sins contrary to nature, whereby the very order of nature is violated, an injury is done to God, the Author of

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nature.” A privileged set of human relationships—almost all concerning sex, gender, and family—were held to be inscribed in the order of nature, transcending the justifications of merely human reason. According to Aquinas and a long line of natural-law jurists stretching into the eighteenth century, it was, for example, a given of nature that human offspring require the attentions of both mother and father; hence the institution of marriage is dictated by natural law for our species. The differences among animal species were laid down by nature; hence the horror of bestiality. From a later, Humean point of view, the entire corpus of natural law might be described as an argumentative machinery for transforming natural order into moral order. But this description obscures the ultimate source of nature’s moral authority, namely God. Because God was “the Author of nature,” the natural order was ipso facto a moral order. What requires explanation within this framework is not how “is” converted to “ought,” but rather why over-turning some parts of nature but not others counted as unnatural: for example, bestiality was contra naturam, but domestication was not. [. . .]

The supernatural carried the highest degree of authority by negating the natural altogether. Within the Judaic and, especially, Christian traditions, God made his will known through “signs and wonders,” spectacular suspensions of the natural order—the parting of the Red Sea, walking upon water, the raising of the dead—that warranted the miracle-worker as God’s mouthpiece. [. . .]

Because the agents of the preternatural were multiple, the question of authority was commensurately more complicated. God, demons, humans, and unaided nature

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7 Aquinas, *Summa theologica*, Ila—IIae, 153.12.
might all bring about marvels by knitting together causes and virtues of things rarely conjoined. God might engineer a monstrous birth or celestial apparition as a warning to sinful Christians—but so might a deceptive demon, a wily sorcerer, or nature itself. In witchcraft trials or disputes over putative portents or miracles, agency was hotly debated: could a sudden cure (or sudden malady) have come about by nature alone, was it rather the result of demonic or magical manipulations, or had God directly intervened? If the agency was divine, the event carried almost the same authority as a miracle; if demonic, negative authority. Even when a marvel was unequivocally assigned to the unaided operations of nature, responses ran the gamut from revulsion to delight. A monster might be regarded as nature’s error or as its finest workmanship, depending on how medical theory, theological doctrine, political instabilities, and aesthetic standards interacted in any given context. But even in the most positive case, preternatural events attributed solely to nature commanded admiration rather than authority.

The cases of the artificial and the unnatural in principle involved no ambiguities about agency, nor any about authority. Only humans produced artifacts and engaged in unnatural conduct; in both cases, the natural was superior to the non-natural. In the case of the natural versus the artificial, the superiority was first and foremost that of workmanship, but where art attempted to alter species, overtones of moral superiority crept in as well: both alchemical and horticultural ambitions to transmute essences called down indignation from critics who understood nature’s boundaries to be not only firm but sacrosanct. In such cases, the artificial shaded into the unnatural. The opposi-
tion of natural versus unnatural provides the sole unambiguous example of the moral authority of nature, and even here it was derivative: the authority of the natural order flowed from the author of nature, God. Hence, in all of its aspects, the moral authority of the natural vis-à-vis the non-natural was at best borrowed and at worst nonexistent.

A New Nature?

All of the boundaries between the natural and the non-natural were morally electrified, and none of them was ever hard and fast. But during the sixteenth and seventeenth centuries, religious reformation, artisanal and artistic innovations, political and social strife, encounters with exotic cultures of the Far East and Far West, and philosophical critiques undermined the very categories of the supernatural, preternatural, artificial, and unnatural. An altered perimeter of the non-natural circumscribed a new order of nature. [. . . ]

Miracles became a battleground not only between Catholics and Protestants, but also within the Counter-Reformation, as church authorities exerted ever-stricter controls over unruly popular piety. When Catholic theologians challenged sixteenth-century reformers like Jean Calvin to produce miraculous attestations of their new faith, as Christ and his disciples had done in the early days of Christianity, the Protestants replied that the age of miracles was past: “As for those who demand miracles from us, they are unreasonable. For we do not forge some new Gospel, but only retain that one whose truth
all the miracles ever performed by Jesus Christ and his Apostles serve to confirm.” In addition to their campaigns against saintly and sacramental miracles, Protestants attacked every new alleged Catholic miracle as a priestly fraud or demonic imposture. The Catholics, for their part, trumpeted each cure by the touch of a saintly relic or exorcism as proof that God took their side. But confronted with their own dissenters from within, Catholic authorities discovered that miraculous warrants from God could be a double-edged sword. The Council of Trent established detailed procedures of inquiry and proof for miracles, and centralized the authority for investigating and deciding cases in the bishop of the diocese where the event occurred. So stringent had evidentiary requirements for Catholic miracles become by the mid-seventeenth century that [they were] among the best-attested historical facts of the period.

Yet ever more evidence inspired ever less confidence in the authenticity of miracles among the learned and powerful. By the late seventeenth and early eighteenth centuries, ecclesiastical authorities in both Protestant and Catholic countries were almost equally reluctant to recognize the authenticity of contemporary divine interventions. [ . . . ] To invoke the authority of God by miracle or enthusiastic inspiration was all too often to subvert the authority of state and established religion, and thereby to incite the populace to insurrection. [ . . . ] It was first and foremost the spokesmen for estab-

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9 When they were evaluated as human testimony, David Hume considered the Jansenist miracles performed at the Parisian parish of Saint-Medard in the 1720s to “much surpass” the miracles of Jesus in “evidence and authority.” David Hume, “Of Miracles,” in An Inquiry Concerning
lished religion who effectively drove the supernatural out of daily life.

This unwillingness to grant the authenticity of any specific miracle performed in the here-and-now was perfectly compatible with the insistence on the part of voluntarists that God’s laws held only by divine fiat, and that in principle God was perfectly able to overrule them whenever he so willed. But he in fact almost never so willed, the voluntarists were hasty to add. The most extreme seventeenth-century representatives of the voluntarist position among natural philosophers—René Descartes, Robert Boyle, Isaac Newton—were at pains to underscore the de facto constancy (though not the autonomy) of the natural order in both their precepts and their practice as natural philosophers. As Boyle declared, God “does seldom manifestly procure from the settled course of the universe, and especially from the most catholic laws of motion—by those signal and manifest interpositions we call miracles,” preferring instead either to coordinate the moral and natural orders by advance planning or to influence “rational minds” to alter the motions of human bodies so as to trigger “salutary or fatal crises” in health.10

The quiet ways of providence replaced the showy displays of miracles. Hence the paradox of the locution “law of nature,” which had originally emphasized the fragility of the world order subject to the vicissitudes of God’s will, but by the early eighteenth century had become synonymous with the most rigid, inviolable regularities.

The preternatural in the early modern period traced a trajectory of steep rise and

gradual decline. From the early sixteenth through the mid-seventeenth century, all forms of the preternatural were the objects of unprecedented legal, medical, theological, philosophical, and popular attention. Portents such as the monster of Ravenna—born in March 1512, foretelling the sack of that city in April by the French army—multiplied during the protracted wars of religion and bloody political struggles that racked much of Europe until the reestablishment of monarchical and ecclesiastical authority in the 1660s. Although monsters and celestial apparitions were interpreted as warnings from God, they did not have full supernatural status. So, for example, Calvin could hedge his denial of latter-day miracles with the caveat, “however, I do not deny that when God wishes to extend his hand to make some judgment worthy of the memory of the world, he sometimes advertises [it] to us by comets.”¹¹ Magistrates, physicians, and theologians attempted to specify the boundaries between the natural, preternatural, and supernatural with unprecedented precision in the contexts of witchcraft trials and disputed miracles. The Wunderkammern [curiosity cabinets] assembled by early modern princes like the Archduke Ferdinand II of Tyrol, humanists like Boniface de Borilly, and naturalists like Ferrante Imperato and Ulisse Aldrovandi juxtaposed the wonders of nature with the wonders of art, the preternatural with the artificial. Finally, the concerted efforts of sixteenth- and early-seventeenth-century natural philosophers—including Francis Bacon—to explain wondrous phenomena largely neglected by medieval Aristotelians, cre-

ated a vigorous tradition of what might be called preternatural philosophy and preternatural history. The latter, at least, vigorously persisted in the annals of the scientific societies of the late seventeenth century.¹²

Hence religious, political, philosophical, legal, medical, and aesthetic developments of the sixteenth and seventeenth centuries conspired to thrust the preternatural to center stage. Yet by the turn of the eighteenth century, the preternatural had all but disappeared as a category of the non-natural. The waning of the preternatural resulted from a tangled conjunction of causes, and I can only draw out a few strands here. The fate of the portentous and demonic aspects of the preternatural paralleled that of the supernatural after the general pacification of western Europe in the last quarter of the seventeenth century. Prodigies that had been exploited to terrify, chasten, incite, and otherwise disquiet the population were summarily reassigned to the realm of the natural, albeit usually without any further specification of causes. As in the case of the subduing of the supernatural, theologians and natural philosophers made common cause in the naturalization of the portentous preternatural. Learned opinion closed ranks against prodigy-mongering, which was increasingly associated with the manipulation of the uneducated folk. Bishop Thomas Sprat saw no disrespect to God in such skepticism: “to hearken to every Prodigy, that men frame against their Enemies, or for themselves, is not to reverence the Power of God, but to make that serve the passions, and interests,

and revenges of men.”

The decline of preternatural history and preternatural philosophy was slower and both intellectually and regionally more uneven. Through the 1710s, both the Royal Society of London and the Académie Royale des Sciences in Paris crammed their annals with preternatural history—reports of marvels such as “a very strange fish” from New England, a bizarre echo from Bordeaux, ants that marched in formation from Surinam, conjoined twins born in Sussex, an extraordinary celestial light observed over Paris. In contrast to preternatural philosophy, these reports only rarely offered an explanation of the strange fact in question, although almost all assumed natural causes. Preternatural philosophy sought specific causes for particular marvels, and probably reached its peak in the period 1550—1620. [. . . ] After circa 1720, natural philosophers in metropolitan academies did not so much debunk as ignore the wonders of nature. [For example,] in 1699 Fontenelle exclaimed that “the most curious treatises of History could hardly rival Phosphors” for wonders, but when in 1730 the academician Charles Dufay succeeded in making many kinds of ordinary stones glow in the dark, Fontenelle happily predicted an end to other unique and therefore marvelous phenomena.14

The decline of the preternatural was intertwined with the transformation of nature from artisan to art in the late seventeenth century. On both the theoretical and practical

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levels, the Aristotelian boundary between the natural and the artificial dissolved in the first half of the seventeenth century. On the theoretical side, well-known pronouncements of Bacon and Descartes declared the identity of artificial and natural essences (or, in the case of Descartes, subsensible machinery). [ . . . ] By the late seventeenth century, the moral suspicions that had still been aroused by such challenges to nature’s superiority a century earlier had largely evaporated. [ . . . ] Art’s imitations no longer usurped the place of nature’s originals, but rather perfected and surpassed them.

It was nature itself that came to be viewed as the usurper of God’s prerogatives. Boyle’s attacks on scholastic maxims like “Nature does nothing in vain” or “Nature does not miss of her ends” might better be described as theocentrism than as antianthropomorphism. To pay nature too great a compliment was to risk offending a jealous God by the worship of false gods: “it is a dangerous thing to believe other creatures, than angels and men, to be intelligent and rational; especially to ascribe to any of them an architectonic, provident, and governing power.”15 For Boyle, nature was an artifact rather than a potentially usurping artisan, an “automaton” created by the divine engineer. Contemporary readers of Boyle would have marked the irony that nature had become an artificial imitation of itself, the “art of God.”

By the final decades of the seventeenth century the basis for merging art and nature had reversed field. The natural no longer subsumed the artificial, as it had for Bacon and Descartes; rather, the artificial subsumed the natural. This was the departure point for the argument from design, from the Boyle Lectures {ref. to Bentley} through the
Bridgewater Treatises (explan): the very artificiality of nature must imply a superintelligent artisan, as clock implies clockmaker. The vision of nature as designing rather than designed was first reviled as hylozooism or Spinozan pantheism, and then almost forgotten. The mechanical philosophy certainly supplied the most dramatic account of nature as mere artifact, but even critics like Gottfried Wilhelm Leibniz, who sought to reinsert a *vis insita* into nature, worried with Boyle about the dangers of idolatry lurking in a fully anthropomorphized nature. As in the case of the supernatural and the preternatural, theological concerns propelled the changes in the relationship between the natural and the artificial in the late seventeenth century. By 1700, nature was enslaved by God to an almost Augustinian degree, albeit with very non-Augustinian consequences for both theology and natural philosophy.

The unnatural had always been the domain of the non-natural in which nature’s moral authority had spoken loudest, especially in matters of sex, gender, and family. [ . . . ] What is important for my purposes is the persistence of the category of the unnatural and of the moral sanctions attached to it. Consider the case of hermaphrodites: as marvels, they belonged to the realm of the preternatural, and were, to judge from sixteenth-century compilations of wonders in which they figured prominently, viewed as evidence of nature’s delight in variety. But when alleged hermaphrodites were reclassified as men or (mostly) women with genital abnormalities and/or as transvestites, they became potential sodomites, and therefore unnatural. As in the case of miracles and portents,

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15 Boyle, *Free Inquiry* (above, n. 27), pp. 164, 188.
these classificatory ambiguities were played out in practice as well as in theory. In 1601, for example, when Marie Le Marcis, a twenty-year-old hermaphrodite from Rouen, began dressing as a boy, took the name of Marin, and attempted to marry the widow Jeanne Le Febvre, physicians, surgeons, midwives, and magistrates involved in the case struggled to type Marie/Marin not only by sex but also by category of the non-natural. The examining physician Jacques Duval was persuaded that Le Marcis was a genuine hermaphrodite, and therefore preternatural; the magistrates of Rouen decided it was a case of a woman masquerading as a man with lewd intentions, and charged Le Marcis with the unnatural crime of sodomy. Both Le Marcis and Le Febvre insisted before the court that Le Marcis “had only made use of what nature had formed in him.” The increasing tendency to class hermaphrodites as unnatural sodomites in the seventeenth and early eighteenth centuries can be read as evidence for both the fading of the preternatural and the reassertion of the unnatural as moral arbiter in sexual matters.17

Of all the categories of the non-natural, the unnatural appears to have weathered the early modern period with the fewest alterations, although more research is needed to establish this claim firmly. The major change seems to have been the shift from divine edict, executed by nature, to natural law tout court. [ . . . ] The medieval opposition between natural and unnatural was reintegrated into a framework of social contract and self-evident intuitions rather than God’s commands. Here, and here alone, nature was

largely emancipated from God. "Unnatural" was still a charge reserved for the most outrageous crimes, like patricide, but its authority was freestanding: late-seventeenth- and early-eighteenth-century jurists preferred to derive its force from the filial piety implanted by nature rather than from the Mosaic code revealed by God. But the realm of the unnatural remained largely the same, still governing familial and sexual relationships. [ . . . ] The authority of the natural against the unnatural had always been irrefragable; by the early eighteenth century it had also become self-sufficient.

To summarize this section: Given these changes in the categories of the non-natural, how did the nature of circa 1700 differ from the nature of circa 1500? The most striking changes must be chalked up to theology and jurisprudence rather than to natural philosophy, natural history, and the mixed mathematical disciplines. The briefest epitome of these changes would be the centralization of divine authority and the imposition of order. The metaphor of the "laws of nature," which gained wide currency in the seventeenth century, captures both aspects, as well as the tension between them. God imposed laws upon nature by fiat, and sustained these laws without the aid or interference of semi-autonomous agents like nature or demons. Although God could legislate new laws or suspend old ones, divine foresight and consistency obviated the need for such direct interventions—at least after the establishment of the Christian religion. It is no accident that such views of divine sovereignty coincided in time and substance with the centralizing, pacifying policies of late-seventeenth-century monarchies. The connection is not simply one of analogy—for example, between the unification of local cus-
tory law under royal statute law on the one hand, and the “universal laws of motion” on the other—although it was that as well.⁰¹⁸⁰¹ There was also a cause-effect connection between the claims of political and religious dissidents to supernatural support and the mounting reluctance of religious and political authorities in the late seventeenth century to acknowledge that God overruled his own rules. Miracles (and portents) were not only analogous to civil disorder; in the context of the protracted and bloody disputes of the seventeenth century, miracles had repeatedly caused civil disorder.

What cannot be emphasized enough is that “naturalization” in no sense explains these late-seventeenth-century shifts in the meanings of nature. First, natural-philosophical attempts to provide detailed natural explanations of apparent exceptions to the natural order reached their zenith in the late sixteenth century, not the late seventeenth. Second, not only did natural philosophers after 1660 effectively abandon attempts to explain the strange facts they accumulated, they also never made any systematic attempt to discredit them. Third, the very meaning of natural cause, and hence the standards for natural explanation, were and remained controversial throughout this period. One need only recall the contrasting positions of Christiaan Huygens, Boyle, Leibniz, and Newton on the status of forces in mechanics—and the situation was still more disunified in other disciplines. Fourth, in the few cases in which natural philosophers succeeded in explaining erstwhile preternatural or supernatural phenomena—comets, for example—learned opinion, including the bulk of theological opinion,

had long since reclassified them as natural. Comets had ceased to be portents at least
two decades before Edmond Halley’s mathematical calculations on their periodicity
were published in 1705; his predictions were not confirmed until 1758. The new natural
order of the late seventeenth century was not forged out of the specific achievements of
the Scientific Revolution, although it was forged with the consent and collaboration of
naturalists.

Nature and Legitimation

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To return to the questions posed in the introduction: First, what were the sources
(and limits) of the cultural authority wielded by nature as a result of early modern trans-
formations? Second, does the argument of legitimation from nature square with the re-
sources that early modern views of nature actually supplied? The answer to the first is
surprisingly restricted. If the order of nature was beautiful and benevolent—if “Whatever
is, is right,” in Pope’s couplet—it was because God had made it so. By eliminating all
traces of nature’s autonomy, by converting nature into the “art of God,” evidence from
natural philosophy and natural history might buttress natural theology without thereby
granting nature any independent authority. Anthropomorphic projections were rife in
eighteenth-century natural history, but there is little evidence that these projections were
then used to stiffen social norms. [ . . . ] The sole case in which nature exercised its
own authority was in natural-law jurisprudence and social theory. Here the order of na-
ture was frankly moralized, not loftily neutral. Although natural-law arguments could be and occasionally were used to subvert as well as to shore up prevailing norms, the range of their most forceful sanctions—the unnatural—did not widen much beyond the traditional preoccupations with sex and family.

These considerations suggest some tentative answers to the second question. It is doubtful that the authority of nature alone would have sufficed to justify seventeenth- and early-eighteenth-century political regimes. Natural phenomena, ordinary or extraordinary, carried weight in human affairs only if God’s authority was additionally invoked. Without divine props the authority of the natural shrank drastically: the charge of “unnatural” could be hurled only at those who deviated from conventional gender or familial roles. Hence for most of the early modern period, claims about legitimation by appeals to the authority of nature should be correspondingly curtailed. The situation changed dramatically in the latter half of the eighteenth century, in large part because the order of nature had been universalized—witness the revealing interaction between the slogans “natural” and “universal” in the campaign to institute the metric system during the French Revolution.¹⁹ The emergence of an ostensibly amoral nature, to which controversial political and social questions might be referred for allegedly impartial arbitration, can also be roughly dated to the late eighteenth century. It is this putative neutrality of nature that makes ideology in the Marxist sense thinkable; earlier orders of nature could not have sustained this particular form of abuse, any more than the nineteenth-century
order of nature could have sustained portents and prodigies.

The morals for the mythologies of disenchantment are several: early modern conceptions of the natural and non-natural did shift significantly, but neither putative causes nor putative effects withstand close scrutiny. The causes are to be sought as much in jurisprudence and, especially, in theology, as in the Scientific Revolution; the effects must be stretched out over the entire eighteenth century and at least the beginning of the nineteenth, with more careful attention to the logical and historical independence of beliefs that were previously fused together—for example, “nature is governed by inviolable laws” neither logically implies nor historically coincides with “nature is uniform always and everywhere.” In short, all of modernity cannot be found tiny and pre-formed in the early modern.

The morals for the history of science are more tentative. I suggest only one in conclusion: the need to critically reexamine our current reliance on the notion of “legitimation.” This point goes beyond the shakiness of arguments about legitimation by appeal to the authority of nature in the sixteenth and seventeenth centuries. It would be easy enough to replace the authority of nature with some other form of justificatory bedrock. My uneasiness concerns the stratigraphic metaphors that permeate all current discourse about legitimation, regardless of how one orders the layers. Legitimation—of a person, a discipline, a claim, a practice, a finding, an institution—implies a hyperrational logic of trust and belief. A Humean skepticism apparently governs all intellectual

and social relationships on this account: check the credentials, sift the evidence, demand proof, replicate the results. Accept no one and nothing on faith; ground the less legitimate on the more legitimate (as Aristotle would have us ground the less well known on the better known in demonstrations). It is indeed possible to find such rigorous guidelines recommended in early modern scientific precept—for example, Bacon’s lawyerly instructions on how to evaluate testimony in natural history—but it is considerably more difficult to find instances of them applied in practice. The most impressive machinery of proof and legitimation in early modern Europe was to be found not in science but in religion, in the elaborate and refined procedures used by ecclesiastical authorities to investigate miracles. It is not an accident that Hume developed his rules for the evaluation of the evidence of testimony and things in the context of an inquiry into miracles. It is paradoxical but possible that matters of faith demanded legitimation, but that matters of science demanded only faith. This is a deliberate hyperbole—but before dismissing it out of hand, it would be well to remember that by early modern standards the merely human reasoning of demonstration, that form of legitimation par excellence, was epistemologically inferior to the immediate intuitions of angels.

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