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Subduing the Earth: Genesis 1, Early Modern Science, and the Exploitation of Nature

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In a short paper which appeared thirty years ago in the journal *Science*, historian Lynn White, Jr., suggested that in “the orthodox Christian arrogance toward nature” may be found the ideological source of our contemporary environmental woes. The Christian doctrine of the creation sets the human being apart from nature, advocates human control of nature, and implies that the natural world was created solely for our use. The biblical text that best exemplifies this view is Gen. 1:28: “And God said to them ‘Be fruitful and multiply, and fill the earth and subdue it; and have dominion over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth.’” In the Christian Middle Ages, according to White, we already encounter evidence of attempts at the technological mastery of nature, and of those incipient exploitative tendencies that come to full flower in scientific and technological revolutions of later eras. All of this is attributed to the influence of Judeo-Christian conceptions of creation. Christianity, White concludes, “bears a huge burden of guilt for environmental deterioration.”¹

White’s views have attracted considerable criticism. Historians have pointed out that the exploitation of nature is not unique to the West; biblical scholars have maintained that the relevant passages of the Judeo-

¹ Lynn White, Jr., “The Historical Roots of Our Ecological Crisis,” *Science* 155 (1967): 1203–7. Major discussions of the thesis include Ian Barbour, ed., *Western Man and Environmental Ethics: Attitudes towards Nature and Technology* (Reading, Mass.: Addison-Wesley, 1973); Donald Gowan and Millard Shumaker, *Subduing the Earth: An Exchange of Views* (Kingston: United Church of Canada, 1980), esp. the bibliography; Robin Attfield, *The Ethics of Environmental Concern* (Oxford: Blackwell, 1983); David Spring and Eileen Spring, eds., *Ecology and Religion in History* (New York: Harper & Row, 1974); Carl Mitcham and Jim Grote, eds., *Theology and Technology: Essays in Christian Analysis and Exegesis* (New York: University Press of America, 1984); Jeremy Cohen, “Be Fertile and Increase, Fill the Earth and Master It”: *The Ancient and Medieval Career of a Biblical Text* (Ithaca, N.Y.: Cornell University Press, 1989), pp. 15–18; and Elspeth Whitney, “Lynn White, Ecotheology, and History,” *Environmental Ethics* 15 (1993): 151–69.

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Christian scriptures do not sustain the interpretation placed on them by White and his followers; social scientists have claimed that no correlation presently obtains between Christian belief and indifference to the fortunes of the environment. Moreover, since the publication of White's article, more nuanced accounts of the ideological sources of Western attitudes toward nature have appeared. In the influential *Man's Responsibility for Nature* (1974), John Passmore identified two distinct emphases within the Christian tradition, despotism and stewardship, suggesting that the counterproductive attempt to dominate nature—"man as despot"—owes more to Greek conceptions than to the biblical tradition.² But despite these developments, the idea that the Christian doctrine of creation provided the ideological basis for the exploitation of the nature has proven tenacious. White himself saw no reason to resile from his original observations, and his views, despite their never having been developed to any great degree, continue to attract adherents. The presumed historical link between the Christian doctrine of creation and the Western attitude toward nature has been endlessly rehearsed in the burgeoning literature on environmental degradation and its causes. In a further development, many within the Christian tradition itself have endorsed aspects of the White thesis, calling for a radical revision of those traditional Christian doctrines that are supposed to have inspired ecological irresponsibility and chauvinism toward the natural world.

In this article I shall examine some of the ways in which the creation narratives of Genesis were used in the medieval and early modern periods, with a view to showing that "the roots of our environmental crisis" are somewhat more complex than either White or his critics imagined.³ As we shall see, while the biblical imperative "have dominion" played an important role in the rise of modern science and is undoubtedly implicated in what appears to be the "exploitation" of nature, the same imperative, when linked to the human fall, also promoted the goal of the restoration of the earth. "Despot" and "steward" thus turn out to be twin aspects of single role, rather than opposing traditions. In addition, I will suggest that the supposed anthropocentrism of the Western tradition has little to do with environmental degradation, falling into decline at precisely that historical moment that witnesses the beginnings of the large-scale exploi-

² John Passmore, *Man's Responsibility for Nature* (London: Duckworth, 1974), pt. I. See also Clarence Glacken, *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century* (Berkeley: University of California Press, 1973).

³ The need for such a study has already been pointed out by Jeremy Cohen, "The Bible, Man, and Nature, in the History of Western Thought: A Call for Reassessment," *Journal of Religion* 65 (1985): 155–72. To a degree, this need has been admirably met by Cohen's "*Be Fertile and Increase*." However, his study, comprehensive as it is, deals with only the ancient and medieval periods.

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tation of nature. There is, therefore, a need to revise standard accounts of the religious origins of Western attitudes toward nature and to call into question the fundamental premise of those new, ecologically sensitive theologies that too easily concede that the ecological crisis is to be attributed in part to the Christian doctrine of creation.

I

Before proceeding to the history of interpretation of Genesis 1 in medieval and early modern periods, it is worth dwelling briefly on a common but misplaced line of argument in this general discussion. Some of the most vocal attacks on the White thesis have come from the sphere of biblical criticism. A number of biblical scholars have patiently tried to explain that when we examine such Hebrew terms as “have dominion” and “subdue,” we find that they do not really mean “have dominion” and “subdue.” James Barr, for example, informs us that the verb *rada*—“have dominion”—is not a particularly strong expression and was used to refer to Solomon’s peaceful rule; *kabash*, “subdue,” refers simply to “the ‘working’ or ‘tilling’ of the ground in the J story.”⁴ Lloyd Steffen follows suit, pointing out that while it is true that one of the meanings of the word “dominion” (*rada*) is “to tread down,” what the term denotes in the Genesis context is “the ideal of just and peaceful governance.” Dominion, he concludes, “is not a domination concept.”⁵

Other biblical scholars have accused White of being ignorant of findings of source criticism. The creation stories in Genesis, we are told, have their origins in two distinct sources—the priestly account, P, and the Yahwist, J—and these sources ought not to be confused. Had not Lynn White been “critically illiterate,” Richard Hiers observes, he would not have conflated the P and J creation stories, “thereby obscuring and omitting sig-

⁴ James Barr, “The Ecological Controversy and the Old Testament,” *Bulletin of the John Rylands Library* 55 (1972): 9–32, esp. p. 22.

⁵ Lloyd H. Steffen, “In Defence of Dominion,” *Environmental Ethics* 14 (1992): 63–80. For similar analyses, see Atfield, pp. 27–32; Claus Westerman, *Creation* (London: SPCK, 1974), pp. 52 and 82, and *Genesis 1–11: A Commentary*, trans. J. Scullion (Minneapolis: Augsburg, 1984), p. 159; Susan Bratton, “Christian Ecotheology and the Old Testament,” *Environmental Ethics* 6 (1984): 195–209; George Coats, “God and Death: Power and Obedience in the Primeval History,” *Interpretation* 29 (1975): 227–39; Gowan and Shumaker, pp. 16–17, 22. An exception to these awkward attempts to avoid the natural sense of the passages in question is Wilhelm Fudpucker, who with refreshing honesty suggests that the biblical injunction “subdue the earth” should be translated with its full force, “to tread down;” “to conquer,” “to trample”; see his “Through Christian Technology to Technological Christianity,” in Mit-cham and Grote, eds., pp. 53–69. See also John Black, *The Dominion of Man* (Edinburgh: Edinburgh University Press, 1970), p. 37; A. S. Kapelrud, “Die Theorie der Schöpfung im Alten Testament,” *Zeitschrift für die alttestamentliche Wissenschaft* 91 (1979): 159–69; Hans Wolff, *Anthropology of the Old Testament* (London: SCM, 1974), pp. 226–27.

nificant elements.”⁶ J. Baird Callicott complains similarly that White mistakenly thinks of Genesis “as a composite whole,” and that he jumps carelessly between J and P to wrest his preferred interpretation from the text.⁷

Finally, a number of critics have pointed out that the bible does not present a single perspective on the question of the human relation to the natural world. There are, Ian Barbour points out, “diverse strands in the Bible” regarding this issue.⁸ If Genesis contains a dominion concept, it also puts forward one of stewardship. Gabriel Fackre thus suggests that Genesis teaches “stewardship over the earth before a higher claimant.” Human beings, he adds, are “called to tend the earth in responsibility to its Creator.”⁹ John Passmore speaks similarly of a minority view within the Western tradition, which regards the human being as steward rather than a despot.¹⁰ Indeed White himself has remarked that the most common complaint he received regarding his thesis was that he had ignored the fact that human dominion granted by God was intended to make human beings stewards of his creation rather than its despoilers.¹¹

What such criticisms fail to take into consideration, however, is the fact that the original meaning of the text, or the true meaning of the text, or the meaning of the text as established by current methods of biblical criticism, is at best tangentially related to the issue of how the text might have informed attitudes toward nature and environmental practices. White’s thesis is not concerned with the meaning of the text as such, with how it was understood by the community in which it first appeared, or with what modern biblical scholars have made of it, but rather with what the text was taken to mean at certain periods of history, how it motivated specific activities, and how it came to sanction a particular attitude toward the natural world. In other words, it is the reception of the text, and not its presumed meaning, which is at issue here. White’s thesis does not therefore lie within the ambit of biblical criticism or hermeneutics but in the sphere of history.¹² Thus it is not clear that contemporary under-

⁶ Richard H. Hiers, “Ecology, Biblical Theology, and Methodology: Biblical Perspectives on the Environment,” *Zygon* 19 (1984): 43–59, esp. 45. Also, on J and P, see Black, pp. 40–41.

⁷ J. Baird Callicott, “Genesis Revisited: Murian Musings on the Lynn White, Jr. Debate,” *Environmental History Review* 14 (1990): 65–90.

⁸ Barbour, ed., p. 6.

⁹ Gabriel Fackre, “Ecology and Theology,” in Barbour, ed., p. 122.

¹⁰ Passmore, chap. 2. Passmore notes, however, that there is “very little” support for this interpretation within the Christian tradition. The “stewardship” tradition was originally identified by Black, pp. 44–57.

¹¹ Lynn White, Jr., “Continuing the Conversation,” in Barbour, ed., p. 60.

¹² Thus, attempts to refute the White thesis on the basis of contemporary social scientific studies of religious belief and attitudes to the environment are also misplaced. For examples of such studies, see Michelle Wokomir et al., “Substantive Religious Belief and Environmen-

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standings of the meaning of the Genesis accounts of the creation have a direct bearing on the question of how such texts were used in the past, nor on what practices they might have encouraged. In order to evaluate claims about a connection between biblical doctrines and attitudes toward nature, we need to abandon the quest for definitive meaning and attend to the history of interpretation of the relevant texts.¹³

II

For the first fifteen hundred years of the Christian era there is little in the history of interpretation of Genesis to support White's major contentions. Patristic and medieval accounts of human dominion are not primarily concerned with the exploitation of the natural world. A common patristic reading of "dominion over the beasts," for example, relies upon the ancient conception of the human being as a microcosm of the world and internalizes the idea of dominion, directing it inward to the faculties of the human soul. Origen, the third-century church father who pioneered the allegorical reading of scripture, pointed out that the mind is "another world in miniature" and that it contains all manner of living things.¹⁴ The allegorical reading of the creation of the animals thus construed them as "the impulses and thoughts of our mind which are brought forth from the depths of our heart."¹⁵ Accordingly, the dominion over nature re-

talism," *Social Science Quarterly* 78 (1997): 96–108; Douglas Eckberg and T. Jean Blocker, "Varieties of Religious Involvement and Environmental Concerns: Testing the Lynn White Thesis," *Journal for the Scientific Study of Religion* 28 (1989): 509–17.

¹³ Some of White's critics seem to concede this point. Barr candidly admits: "It is of course possible to argue that the Genesis account of creation has had an influence not through its own original meaning but through interpretations which have been placed upon it. . . . This may or may not be so; I have not been able to carry out a study of the ways in which Genesis in this regard has been used over a period of many centuries" (Barr, p. 23). Also, Whitney (n. 1 above) states that "White's claim that the Bible had inspired the development of Western technology and control of nature rested not on the biblical text per se or on any 'timeless' theological explication of it. . . . The crucial question, therefore was not so much what the writers of the Old and New Testaments had meant about technology, or even how their world might be construed by modern readers, but how the Bible had been interpreted in the Middle Ages and after" (p. 162). Compare Odil Steck, *World and Environment* (Nashville, Tenn.: Abingdon, 1980), p. 198; Roderick Nash, *The Rights of Nature* (Madison: University of Wisconsin Press, 1988), p. 89.

¹⁴ Origen, *Homilies on Leviticus* 5.2, in *Fathers of the Church* (hereafter *FC*) (Washington, D.C.: Catholic University of America Press, 1947–), 83:91–92. For other readings suggesting the human microcosm, see Gregory, *Homiliae in Evangelium* 29 in *Patrologia cursus completus, series Latina* (hereafter *PL*) (Paris 1958–), ed. J. P. Migne, 76:1212; Ambrose, *Hexameron* 6.2.3; Gregory of Nyssa, *De hominis opificio* 4.1. Also see Patricia Cox, "Origen and the Bestial Soul," *Vigiliae Christianae* 36 (1982): 115–40, esp. 123.

¹⁵ Origen, *Homilies on Genesis* 1.11 (*FC* 71:60). See also the fragment attributed to Origen, D. Glaue, ed., *Ein Bruchstück des Origenes über Genesis 1, 28* (Giessen: Alfred Töpelmann, 1928), pp. 8–10.

ferred to in Genesis was frequently interpreted by the church fathers to mean dominion over the rebellious beasts within. "The saints and all who preserve the blessing of God in themselves exercise dominion over these things," wrote Origen, "but on the other hand, the same things which are brought forth by the vices of the flesh and the pleasures of the body hold dominion over sinners."¹⁶ Jerome similarly identified various beasts with the "irascible and concupiscible passions," while John Chrysostom advocated "bringing the beast under control" by "banishing the flood of unworthy passions."¹⁷ Augustine thought that the beasts "signify the affections of the soul." The unruly impulses of the body are thus "animals" that "serve reason when they are restrained from their deadly ways."¹⁸ The imperative force of the biblical injunction "have dominion" thus became, during the patristic period, a powerful incentive to bring rebellious carnal impulses under the control of reason.

This allegorical approach to texts, which became universal practice during the Middle Ages, also informed the structures of knowledge of the natural world. Knowledge of things was not pursued in order to bring nature under human control but, rather, to shed light on the meanings of nature and of the sacred page. Nature and scripture were both books, and their elucidation called for an interpretive science. Living things, it was assumed, had been designed in part to serve for the physical needs of human beings but equally to serve a spiritual function as well. In this latter role, natural objects symbolized eternal verities, or taught important moral lessons. Nature, in this scheme of things, was to be known in order to determine its moral and spiritual meanings and not so that it might be materially exploited.

No work embodies this approach to nature better than the *Physiologus*—a work on animals, plants, and stones, produced in Alexandria at some time between the second and fifth centuries. The *Physiologus* sets out the moral and theological significance of numerous natural objects. Throughout the Middle Ages it was to enjoy a popularity second only to the Bible itself. Indeed in the jaundiced judgments of previous generation of scholars, this was the work that substituted fanciful fables for the measured and rational judgments of Aristotelian natural history, eclipsing for a thousand years the systematic scientific approach of the Greek

¹⁶ Origen, *Homilies on Genesis* 1.16 (FC 71:69).

¹⁷ Jerome, *Commentariorum in Hiezechielem* 1.1.6/8, Corpus Christianorum Series Latina, vol. 75 (Turnholt: Brepols, 1975), pp. 11 ff. Jerome, *Homilies* 7, 30. John Chrysostom, *Homilies on Genesis* 8.14 (FC 74:113). Compare Philo, *De plantatione* 11.43, *De opificio mundi* 51.146, 53.151.

¹⁸ Augustine, *Confessions* 13.21, trans. Henry Chadwick (Oxford: Oxford University Press, 1991), p. 291.

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philosopher.¹⁹ Yet the fables of the *Physiologus* helped created a rich symbolic world in which natural objects came to be invested with profound and mystical meanings. If this was not a scientific view of nature, it was nonetheless one which found in the cosmos a moral and theological order and located human beings at its centre.

In one sense, the *Physiologus* might be said to present a utilitarian approach to the natural world. However, the utilities of living things are seen to reside in their symbolic and moral functions. The fox, to take a single example, is described thus:

The fox is an entirely deceitful animal who plays tricks. If he is hungry and finds nothing to eat, he seeks out a rubbish pit. Then, throwing himself on his back, he stares upwards, draws in his breath, and thoroughly bloats himself up. Now the birds, thinking the fox dead, descend upon him to devour him. But he stretches out and seizes them, and the birds themselves die a miserable death.

The fox is a figure of the devil. To those who live according to the flesh he pretends to be dead. Although he may hold sinners in his gullet, to spiritual men and those perfected in faith, however, he is dead and reduced to nothing.²⁰

The purpose of the fox is to teach an important lesson, to inspire the faithful, and to give pause to the apostate. Nature had not been created solely, or even primarily, to cater for the material needs of the human race, but to serve spiritual and moral requirements as well. The use of creatures, in this scheme of things, requires knowledge of their meanings. The *Physiologus* promotes an anthropocentric conception of nature, but it is a conception that takes a passive, interpretive view of the world, rather than one that actively seeks its material exploitation. The enormously popular bestiaries of the later Middle Ages were all based on the *Physiologus*.²¹ These books of birds and beasts reinforced the symbolic and moral functions of the things of nature.

With the thirteenth-century translation of the biological works of Aristotle into Latin, a new source of knowledge of the natural world arrived in the West. If the monasteries tended to persist with the emblematic approach of the bestiary, the new schools turned to the writings of the Greek philosopher, producing encyclopedic works which, collating a wide

¹⁹ Patricia Cox, "The *Physiologus*: A Poiesis of Nature," *Church History* 52 (1983): 433–43, esp. 433.

²⁰ *Physiologus* 17, trans. Michael Curley (Austin: University of Texas Press, 1979), pp. 27–28.

²¹ For the story of the fox in twelfth- and thirteenth-century bestiaries, see, e.g., *Bestiary*, trans. Richard Barber (Woodbridge: Boydell, 1993), p. 65; *The Book of Beasts*, trans. T. H. White (London: Cape, 1954), pp. 53–54. For general studies of the bestiaries, see M. R. James, *The Bestiary* (Oxford: Roxburghe Club, 1928); Florence McCulloch, *Medieval Latin and French Bestiaries* (Chapel Hill: University of North Carolina Press, 1962); W. B. Clark and M. T. McMunn, eds., *The Bestiary and Its Legacy* (Philadelphia: University of Pennsylvania Press, 1989).

variety of sources, contained all extant knowledge of natural things.²² The rediscovery of ancient Greek knowledge during the course of the twelfth and thirteenth centuries thus inspired a more direct engagement with the empirical world, adding a new dimension, the idea of dominion over nature. Yet we still do not encounter an explicit ideology of material exploitation of the world. Rather, the new emphasis is on the intellectual mastery of the knowledge of living things. Adam, it was believed, had once enjoyed a perfect knowledge of nature, a knowledge evidenced in his naming of the creatures (Gen. 2:20). With the fall, the creatures rebelled, and antipathies developed among them and between them and the erstwhile masters. The creatures were now to be reunited in the human mind. The thirteenth-century Franciscan Bonaventure wrote that Adam in the state of innocence “possessed knowledge of created things and was raised through their representation to God and to his praise, reverence and love.” With the fall, Adam and his progeny had become alienated from God and had lost that knowledge. For Bonaventure, the reaccumulation of this lost knowledge was “the goal of the creatures and the way they are led back to God.”²³ To know the things of nature was thus to reorder them mentally. Honorius Augustodunensis, author of the popular medieval digest of cosmology and geography *Imago mundi*, had written something similar in the twelfth century. Man, he claimed, is the supreme animal in which God willed all things to be reunited.²⁴ Knowledge of the creatures was thus another way of restoring, in a fashion, the original dominion that the human race had once enjoyed. Two of the dominant senses of dominion that we encounter in the patristic period and the Middle Ages are thus to do with the realm of the human mind. Both rely to a degree on the idea of the human microcosm. Thomas Aquinas is typical of the Middle Ages in claiming that human dominion over things is intimately related to the fact that the human individual “contains all things.”²⁵

Having said this, it must be conceded that the modification of nature,

²² Michel de Bouïard, “Encyclopédies médiévales: Sur la ‘connaissance de la nature et du monde’ au Moyen Âge,” *Revue des questions historiques*, ser. 3, 16 (1930): 258–304, esp. 267, n. 2. Willene Clark, *The Medieval Book of Birds: Hugh of Fouilly's Aviarum* (Birmingham, N.Y.: Medieval and Renaissance Texts and Studies, 1992), introduction, p. 23.

²³ Bonaventure, *Hexameron* 13, quoted in J. McEvoy, “Microcosm and Macrocosm in the Writings of St. Bonaventure,” *Commissio Internationalis Bonaventuriana S. Bonaventura: Volumen Commemorativeum . . . Cura et Studio Commissionis Internationalis Bonaventuriana* (Rome: Padre di Editori di Quaracci, 1972–74), p. 330.

²⁴ Honorius Augustodunensis, *Hexameron* 3 (PL 172:258D–259A), *De animae exilio et patria* 13 (PL 172:1246B). Compare Hugh of St. Victor, *De arca Noe morali*, Prologus (PL 176:619), *In ecclesiasten homiliae* (PL 174:277D), *Didascalicon* 2.1, trans. J. Taylor (New York: Columbia University Press, 1961), p. 61.

²⁵ Thomas Aquinas, *Summa theologiae* 1a.96.2, Blackfriars edition (London: Eyre & Spottiswoode, 1964–76).

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oftentimes on a large scale, undoubtedly took place during the Middle Ages. The pious spiritual works performed by medieval monastic communities, for example, were invariably accompanied by more mundane pursuits, for the monasteries in which these acts of contemplation were to occur, of necessity, had also to cater for bodily needs. This in turn required agriculture and husbandry and the transformation of woods and swamps into fields and pastures. William of Malmesbury thus lauded the improvements made to the natural world by the industry of the monks of Thorney:

In the middle of wild swampland where the trees are intertwined in an inextricable thicket, there is a plain with very green vegetation which attracts the eye by reason of its fertility; no obstacle impedes the walker. Not a particle of the soil is left to lie fallow; here the earth bears fruit trees, there grapevines cover the ground or are held on high trellises. In this place cultivation rivals nature; what the latter has forgotten the former brings forth. What can I say of the beauty of the buildings whose unshakeable foundations have been built into the marshes. . . . This is an image of Paradise; it makes one think already of heaven.²⁶

Reference to the reconstruction of a paradise on earth seems to suggest that here we have a clear instance of a religiously motivated attempt to conquer nature. Yet this was not an engagement with natural world in order to assert dominion or reap material gain; neither was it informed by a callous disregard for the earth. It was otherworldly preoccupations that motivated this activity. Malmesbury thus continues: "This incomparable solitude has been granted the monks so that they may grow more closely attached to the higher realities for being the more detached from those of mortal life."²⁷ Control of nature was exercised in this attenuated fashion to promote the concerns of the other world and thus, paradoxically, to further a detachment from material nature.

White himself has pointed to other examples of medieval attempts to master nature that occur quite independent of religious communities. The introduction of the heavy plough into northern Europe made possible the large-scale cultivation of land and lifted agricultural production above the level of subsistence farming. This technological innovation thus revolutionized the relationship between human beings and the land that

²⁶ William of Malmesbury, *De gestis pontificum Angliae*, in *PL* 175:1612–13, quoted in Jean Leclercq, *The Love of Learning and the Desire for God* (New York: Fordham University Press, 1974), p. 165.

²⁷ Leclercq, p. 165. Leclercq thus suggests that "the cloister is the 'true paradise'" and that the surrounding countryside merely "shares in its dignity" (*ibid.*). Other monastic concerns, too, called for the control of nature. Leclercq informs us that a flock of sheep was required to provide the parchment for a single copy of a work by Cicero or Seneca. In addition, the leather to bind such works required the hunting of wild beasts—deer, roebuck, boar (p. 155).

they inhabited, yielding up food surpluses and facilitating the development of towns. According to White, this single agricultural advance meant that whereas “once man had been a part of nature; now he became her exploiter.”²⁸ In addition, the medieval deployment of an impressive array of machines—water wheels, windmills, cranks and con-rods, fly-wheels, and treadles—are for White symptomatic of “the emergence of a conscious and generalised lust for natural energy and its application to human purposes.”²⁹ Yet in none of this do we encounter the explicit articulation of an attitude of indifference to, or hostility toward, nature. Indeed, there seems to be no compelling reason to view these developments as anything more than particular expressions of the universal tendency of all cultures to seek efficient means to provide for basic human needs. Such activities require no religious ideology to motivate them, nor do they need any other justification than that human beings require food and shelter, and when these are met, further creature comforts as well. The medieval West, in other words, shares with every culture a concern to feed and clothe itself. These imperatives frequently lead to the depletion of natural resources and ecological change. While the modes of exploitation may differ, the underlying impulse is universal.³⁰

What is lacking in this analysis, then, is the identification of a *religiously* motivated ideology of exploitation, explicitly informed by aspects of the Christian doctrine of creation. As I have already suggested, the absence of the obvious candidate here—the biblical conception of dominion—was owing to the fact that the literal force of the imperative “have dominion” was dissipated by moral interpretations. It is telling, in this connection, that the one extensive study that has been carried out on the history of the interpretation of the crucial text Gen. 1:28 (“be fruitful and multiply, and fill the earth, and subdue it; and have dominion”) fails to support the view that it was allied with exploitative material practices during the Middle Ages. Jeremy Cohen, author of this survey, concludes that “the primary meaning of Gen. 1.28 during the period we have studied [ancient and medieval times] [is] an assurance of divine commitment and election, and a corresponding challenge to overcome the ostensive contradiction between the terrestrial and the heavenly inherent in every hu-

²⁸ Lynn White, Jr., *Medieval Technology and Social Change* (Oxford: Oxford University Press, 1964), p. 56.

²⁹ *Ibid.*, p. 129. We also witness in the later Middle Ages the widespread practice of forest clearing by fire or by axe. Glacken (n. 2 above) refers to the period of the eleventh to the thirteenth century as “the great age of forest clearance” (p. 330). For medieval modifications of nature generally, see pp. 318–51.

³⁰ Thus, some of White’s critics have observed that ecological problems are not restricted to the West. See, e.g., Lewis Moncrief, “The Cultural Basis of Our Environmental Crisis,” *Science* 170 (1970): 508–12; Keith Thomas, *Man and the Natural World* (Ringwood: Penguin, 1984), pp. 23–24.

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man being.” In the Middle Ages, Cohen continues, the Genesis text that granted human dominion over nature “touched only secondarily on conquering the natural order.”³¹

While dominion is interpreted psychologically, and while much of nature’s utility is perceived to lie in its symbolic aspects, the goal of physical domination of the world, as an end in itself, fails to take hold. For the Middle Ages, as literal readings of the text “have dominion”—the body of the text as Origen would have it—tend to be subordinated to spiritual readings that referred the reader to the inward disciplines of self-control, so religious motivations for the material domination of nature are secondary to the pursuit of a spiritual dominion of the will over the wild and wayward impulses of the body. Undeniably, the conquest of nature is well in evidence during the Middle Ages, but for the most part this is to be attributed to pragmatic rather than ideological concerns.

However, this state of affairs was to change. Had Cohen extended his labors into the early modern period, a somewhat different picture of the influence of that text would have emerged. In the seventeenth century we find practitioners of the new sciences, preachers of the virtues of agriculture and husbandry, advocates of colonization, and even gardeners explicitly legitimating their engagement with nature by appeals to the text of Genesis. The rise of modern science, the mastery of the world that it enabled, and the catastrophic consequences for the natural environment that ensued, were intimately related to new readings of the seminal Genesis text, “Have dominion.”

III

While the themes of moral and intellectual dominion have not entirely disappeared in the seventeenth century, “dominion over the earth” is now read by most commentators as having to do with the exercise of control not in the mind, but in the natural world. A variety of interrelated factors can be suggested to account for this shift: the demise of the rich, arcane conception of the microcosm in which features of the natural world had been mapped onto the human psyche; the “death of nature,” which saw the replacement of Aristotelian vitalism with a mechanical world view; the collapse of the “symbolist mentality” of the Middle Ages and the radical contraction of sacramentalism, which resulted in a denial of the transcendental significance of the things of nature; the appearance on the religious landscape of this-worldly Protestantism with its attendant work ethic; and finally, the new hermeneutics of modernity, which looks to the

³¹ Cohen, “Be Fertile and Increase” (n. 1 above), p. 313.

literal sense as the true meaning of a text.³² It is this last factor in particular which brings about new readings of the biblical imperative "have dominion."³³

The literal approach to texts that, from the sixteenth century onward, becomes a hallmark of modern hermeneutics, meant that natural objects were no longer to be treated as symbols. The fundamental presupposition of allegorical interpretation was that natural objects could function, like words, as signs. A word in scripture would refer to an object, and the object in turn would refer to some theological or moral truth. Irenaeus had written that "earthly things should be types of the celestial." Origen agreed that "this visible world teaches us about that which is invisible, and . . . this earthly scene contains patterns of things heavenly."³⁴ The disintegration of this symbolist mentality, to which the Protestant insistence that only words and not things have referential functions was a major contributing factor, meant that practical uses would now have to be sought for natural objects that had hitherto served merely symbolic functions. In part, then, "scientific" modes of explanation, along with the search for the practical uses of the things of nature, came into being in order to fill the vacuum left by the demise of traditional medieval systems of representation.³⁵

Now the injunction to exercise dominion over birds and beasts was taken quite literally to refer to the actual exercise of power over the things of nature, its sense no longer being distributed across allegorical, anagogical, or tropological readings. The beasts of Genesis did not represent impulses of the mind, which needed to be bridled by reason, nor was the desired control of living things to be achieved merely through systemati-

³² For discussions of some of these themes, see Caroline Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (New York: Harper & Row, 1990); John Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge: Cambridge University Press, 1991), pp. 82–116; Thomas, pp. 22–24; David Lindberg and Ronald Numbers, eds., *God and Nature: Historical Essays on the Encounter between Christianity and Science* (Berkeley: University of California Press, 1986).

³³ Much of the impetus for the literal reading of texts came from the Protestant reformers. See, e.g., Martin Luther, "The Babylonian Captivity of the Church," in *Three Treatises* (Philadelphia: Fortress Press, 1970), pp. 146, 241; John Calvin, *Institutes* 2.5, trans. H. Beveridge, 2 vols. (London: Clark, 1953); Alister McGrath, *The Intellectual Origins of the European Reformation* (Oxford: Blackwell, 1987), p. 186; Pierre Fraenkel, *Testimonia Patrum: The Function of the Patristic Argument in the Theology of Philip Melancthon* (Geneva: Droz, 1961), pp. 70–93; Hans Frei, *The Eclipse of Biblical Narrative* (New Haven, Conn.: Yale University Press, 1974), p. 37.

³⁴ Irenaeus, *Against Heresies* 4.19, in *Ante-Nicene Fathers* (Edinburgh: T. & T. Clark, 1989), 5:439; Origen, *The Song of Songs, Commentary and Homilies*, trans. R. P. Lawson (London: Longmans, Green, 1957), p. 218.

³⁵ For a more detailed discussion of this general theme, see Peter Harrison, *The Bible, Protestantism, and the Rise of Natural Science* (Cambridge: Cambridge University Press, 1998), esp. pp. 107–20.

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cally ordering them in the mind. Adam had once literally been lord of all the creatures, and this was the kind of dominion sought by his seventeenth-century imitators. With the turn away from allegorical interpretation, the things of nature lost their referential functions, and the dominion over nature spoken of in the book of Genesis took on an unprecedented literal significance.³⁶

There are numerous examples that serve to show how this new impulse of dominion was incorporated into the rhetoric of scientific progress in the seventeenth century. Francis Bacon, who first set out the method of the empirical sciences, famously observed that only “by digging further and further into the mine of natural knowledge” could the human race extend “the narrow limits of man’s dominion over the universe” to their “promised bounds.”³⁷ Genesis taught that dominion had been lost as a result of the Fall but now, through science and industry, that dominion could be restored: “For man by the fall fell at the same time from this state of innocency and from his dominion over creation. Both of these losses however can even in this life be in some part repaired; the former by religion and faith, the latter by arts and sciences. For creation was not by the curse made altogether and forever a rebel, but . . . is now by various labours . . . at length and in some measure subdued to the supplying of man with bread; that is to the uses of human life.”³⁸ The Baconian program of dominion over nature was subsequently adopted by the Royal Society. First historian of the society, Thomas Sprat, stated as one of the group’s objectives a reestablishment of “Dominion over *Things*.”³⁹ In an address delivered to that same august body, Platonist and religious writer Joseph Glanvill announced that the new philosophy had provided “ways of *captivating Nature*, and making her *subserve* our *purposes* and *designments*” leading to the restoration of “the *Empire of Man over Nature*.”⁴⁰ Nature, he was to remark elsewhere, was to be “master’d, managed, and used in the Services of Humane life.”⁴¹ Such services might include “the acceler-

³⁶ On the exposition of Genesis during the early modern period, see Arnold Williams, *The Common Expositor: An Account of the Commentaries on Genesis, 1527–1633* (Chapel Hill: University of North Carolina Press, 1948); Joseph Duncan, *Milton’s Earthly Paradise* (Minneapolis: University of Minnesota Press, 1972), chap. 5.

³⁷ Quoted in Merchant, p. 170; on Bacon and dominion generally, see pp. 164–90. Compare William Leiss, *The Domination of Nature* (New York: George Braziller, 1972), pp. 45–71. On the continent, Descartes offered the similar remark that through science we can “thus make ourselves, as it were, the lords and masters of nature” (*Discourse on Method*, vol. 6, in *The Philosophical Writings of Descartes* trans. J. Cottingham, R. Stoothoff, and D. Murdoch [Cambridge: Cambridge University Press, 1984–], 1:142–43).

³⁸ Francis Bacon, *Novum Organum* 2.52, in *Works*, 14 vols., ed. James Spedding, Robert Leslie Ellis, and Douglas Denon Heath (London: Longman, 1857–74), 4:247–48.

³⁹ Thomas Sprat, *History of the Royal Society* (London, 1667), p. 62.

⁴⁰ Joseph Glanvill, *Scepsis Scientifica* (London, 1665), sig. b3v.

⁴¹ Joseph Glanvill, *Plus Ultra* (London: 1668), p. 87, cf. p. 104.

ating and *bettering of Fruits, emptying Mines, drayning Fens and Marshes.*" "Lands," he concluded, "may be *advanced* to scarce credible degrees of *improvement*, and innumerable other *advantages* may be obtained by an *industry* directed by *Philosophy* and *Mechanicks.*"⁴²

The notion that it was the new natural philosophy that would promote the control of nature also had its inspiration in the Genesis text. During the periods of the Renaissance and the scientific revolution there was a renewed interest in the encyclopedic knowledge that Adam had possessed before his fall. Educational reformer John Webster, to take a single example, pointed out in his attack on the English universities that Adam understood the "internal natures" of all creatures and that "the imposition of names was adequately agreeing to their natures." While this knowledge had been lost at the Fall, it was the proper role of the universities to promote the regaining of this Adamic wisdom, "to know nature's power in the causes and effects" and "to make use of them for the general good and benefit of mankind, especially for the conservation of and restoration of the health of man, and of those creatures which are usefull for him."⁴³ Some of the leading scientists of the seventeenth century actually saw their task as the revival of an ancient science. Adam, it was thought, had subscribed to the heliocentric hypothesis, to corpuscular philosophy, and possibly even the theory of gravitation.⁴⁴ Dominion over the earth was to be established through a regaining of the knowledge once possessed by Adam in Eden. At this time, then, Adam's encyclopedic knowledge was sought not in order to reunite all of the creatures in the human mind and thereby find the way back to the deity, as had been the case in the Middle Ages but, rather, to revisit Adam's literal dominion.

Knowledge alone would not suffice for the domination of nature, however. Work was required. The emergence of the Protestant work ethic, commonly associated with Calvinist notions of election, also gained support from literal readings of Genesis. What made this possible was the fact that the Garden of Eden was now seen to be an actual garden, in

⁴² Glanvill, *Scepsis Scientifica*, sigs. b4r-v.

⁴³ John Webster, *Academiarum Examen* (London, 1654), pp. 29, 19. On Adam's knowledge, see also Francis Bacon, *The Advancement of Learning* (Oxford: Clarendon, 1974), p. 6; William Coles, *Adam in Eden* (London: 1657), preface; Henry Cornelius Agrippa, *Three Books of Occult Philosophy* (London: 1651), p. 153; Thomas Browne, *Religio Medici* (Oxford: Clarendon, 1982), 2.2, p. 65; Lancelot Andrewes, *Apospasmata Sacra* (London, 1657), pp. 208-12; Robert South, *Sermons*, in *English Prose*, ed. W. Peacock, 5 vols. (Oxford: Oxford University Press, 1949), 2:208; John Salkeld, *Treatise of Paradise* (London, 1617), pp. 185-96; George Walker, *The History of the Creation* (London, 1641), p. 193.

⁴⁴ See, e.g., Henry More, *A Collection of Several Philosophical Writings*, 2d ed. (London, 1662), pp. xviii-xix; Richard Bentley, *The Works of Richard Bentley D.D.*, 3 vols. (London, 1838), 3:74; Frank Manuel, *The Religion of Isaac Newton* (Oxford: Clarendon, 1974), p. 23; J. E. McGuire and P. M. Rattansi, "Newton and the Pipes of Pan," *Notes and Records of the Royal Society of London* 21 (1966): 108-43.

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which Adam had literally carried out agricultural work.⁴⁵ Eden was not an allegory of the human soul, and the fruits that Adam had cultivated were not the fruits of the spirit. Neither was paradise to be located in the incorruptible regions of the heavens. Thus Adam's work was not the pious contemplation of higher spiritual realities but a physical engagement with material things.⁴⁶ According to Bishop Lancelot Andrewes, one of the translators of the Authorized Version, God made man "to labour, not to be idle." It was for this reason that Adam "was put into the garden of Eden that he might dresse it and keep it."⁴⁷ English jurist Matthew Hale (whom, incidentally, John Passmore regards as the sole seventeenth-century exemplar of the "stewardship tradition") insisted that the paradise that God had created was one that by its very nature needed to be worked.⁴⁸ Adam's original vocation, Richard Neve thought, sanctified agriculture, and tilling the earth was thus "the most *Ancient*, most Noble, and most Useful of all the Practical *Sciences*"—a science without which, moreover, the earth would quickly degenerate into a wilderness.⁴⁹ In his commentary on the first three chapters of Genesis, John White wrote that when God ordered Adam to subdue the earth, he intended him "by Culture and Husbandry, to Manure and make it fit to yield fruits and provision."⁵⁰ Other commentators agreed that "subduing the earth" was to be understood to mean "plowing, tilling, and making use of it."⁵¹ Such readings suggest that labor came to be more than just a means of providing human sustenance. Work was now regarded as a sanctified activity, an intrinsic good. By implication, working the earth and transforming the natural landscape were no longer simply means to an end, but ends in themselves.

A final incentive for this energetic engagement with the material world came with the linkage of the imperative "have dominion" to justifications of property ownership and colonization. In his *Second Treatise of Government* (1689), John Locke set out the view that in the state of nature, all land had been common. Land became private property when it was im-

⁴⁵ Duncan, pp. 152–54.

⁴⁶ For such allegorical readings of paradise, see Alexander Neckham, *De naturis rerum* 2.49; Guibert of Nogent, *Moralium Geneseos* 1.1.21–24; Bartholomew Anglicus, *De proprietatibus rerum* 15:111, 158. For seventeenth-century criticism of these readings, see Salkeld, p. 4. See also Williams (n. 36 above), p. 110.

⁴⁷ Andrewes, p. 104.

⁴⁸ Matthew Hale, *The Primitive Origination of Mankind* (London, 1677), p. 317.

⁴⁹ Richard Neve [T. Snow, pseudonym], *Apopiroscopy* (London, 1702), chap. 2, p. 3.

⁵⁰ John White, *A Commentary upon the First Three Chapters of the First Book of Moses Called Genesis* (London, 1656), bk. 1, pp. 113–14.

⁵¹ George Hughes, *An Analytical Exposition of the First Book of Moses* (London, 1672), p. 11. Compare John Pettus, *Volatiles from the History of Adam and Eve* (London, 1674), p. 83.

proved by clearing, planting, cultivation, or stocking with animals. The justification for this influential understanding of the basis of property ownership came from the biblical story of creation: for inasmuch as "God and his reason commanded him to subdue the earth, i.e. improve it for the benefit of life . . . he that in obedience to this command of God, subdued, tilled, and sowed any part of, thereby annexed to it something that was his property."⁵² Logically, it followed that those who occupied lands, yet had done nothing to bring them under control, could legitimately be dispossessed of them. Such notions were to play an important role in the justification of overseas plantations and colonies. Richard Eburne explained in *A Plaine Path-way to Plantations* (1624) that colonization was to be justified on account of "God's expresse commandment to *Adam*, *Genesis* 1.28. that hee should *fill the earth, and subdue it*."⁵³ George Walker reasoned similarly that those parts of the world "which are not replenished with men able to *subdue the Earth* and till it," are open to those who could properly exploit them.⁵⁴ Later in the century, clergyman and naturalist John Ray pointed out that the author of nature "is well pleased with the Industry of Man in adorning the Earth with beautiful Cities and Castles, with pleasant Villages and Country Houses, with regular Gardens and Orchards and Plantations." In this respect, he pointed out, Europe differed markedly from "a rude and unpolished America, peopled with slothful and naked Indians," hinting darkly that the conquest of America was in keeping with the biblical injunction to subdue the earth.⁵⁵ Developing conceptions of private property, along with commercial incentives for colonization, thus played their role in the modern conquest of nature, and these factors, too, found their ideological justification in seventeenth- and eighteenth-century readings of Genesis.⁵⁶

In the rhetoric of seventeenth-century scientists and exegetes, then, we encounter new and momentous applications of the biblical imperatives "subdue" and "have dominion." It is difficult to escape the conclusion

⁵² John Locke, *Two Treatises*, in *Works*, 10th ed., 10 vols. (London, 1801), 5:354, 356, 362.

⁵³ Richard Eburne, *A Plaine Path-Way to Plantation* (London, 1624), sig. B2v, pp. 16–18 (emphasis in original). Also see Christopher Hill, *The English Bible and the Seventeenth-Century Revolution* (Ringwood: Penguin, 1994), p. 136.

⁵⁴ Walker (n. 43 above), p. 222 (emphasis in original).

⁵⁵ John Ray, *The Wisdom of God Manifested in the Works of Creation* (London, 1691), pp. 117–18.

⁵⁶ Thus Karl Marx's claim that it was the coming of private property that led Christians to exploit nature is not necessarily inconsistent with the thesis of theological motivation. See Marx, *Grundrisse*, ed. David McLellan (St. Albans: Paladin, 1973), pp. 94–95. On the theological justifications of capitalism generally, see William Coleman, "Providence, Capitalism, and Environmental Degradation: English Apologists in an Era of Economic Revolution," *Journal of the History of Ideas* 37 (1976): 27–44.

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that the Genesis creation narratives provided the program for not only the investigation of nature but its exploitation as well.⁵⁷ Stripped of their allegorical and moral connotations, these passages were taken to refer unambiguously to the physical world and its living occupants. Whatever the ecological practices of medieval societies had been, at no time in the West prior to this do we encounter so explicit an ideology of the subordination of nature. White was correct to assign an important role to the creation story in the development of modern science and technology but mistaken in locating that effect earlier than the seventeenth century.⁵⁸

IV

This may seem to lend support to the general thesis that the biblical account of the creation played an important role in the development of an exploitative attitude toward the natural world. However, the situation is more complex than this. When we attend closely to the seventeenth-century contexts in which the biblical imperative “have dominion” is used to justify the technological mastery of the natural world, we find that dominion is almost invariably associated with the Fall. Many writers allude to the fact the human rule over the earth had been lost through human disobedience to God. The dominion that plays so crucial a role in much seventeenth-century scientific discourse is thus a *recovered* dominion or a *restored* dominion, a pale imitation of that original sovereignty that had been granted to the human race. Loss of dominion, moreover, was not the only misfortune to have followed upon the lapse of our first parents: “Cursed it the ground because of you,” the Lord says to Adam, “in toil you shall eat of it all the days of your life; thorns and thistles it shall bring forth to you; and you shall eat the plants of the field” (Gen. 4:17b–18). As a consequence of the human fall, the natural world, too, it was thought, fell from its original perfection. The whole creation, Saint Paul had written, now “groans in travail” (Rom. 8:22).

For seventeenth-century commentators, the consequences of the divine curse were pervasive. The fallen world inhabited by Adam’s descendants

⁵⁷ In this connection, Bono has recently argued that the Genesis accounts of the Fall and Babel became for the early modern period a “master narrative” that eventually gave rise to scientific practices. See James Bono, *The Word of God and the Languages of Man: Interpreting Nature in Early Modern Science and Medicine* (Madison: University of Wisconsin Press, 1995), vol. 1.

⁵⁸ Compare Glacken: “It is in the thought of this period [i.e., the seventeenth century] that there begins a unique formulation in Western thought, marking itself off from the other great traditions, such as the Indian and the Chinese. . . . The religious idea that man has dominion over the earth, that he completes the creation, becomes sharper and more explicit by the seventeenth century” (Glacken [n. 2 above], pp. 494–95).

was not the earth in its natural state, but an earth suffering under a curse on account of human transgression. The infertility of the ground, the ferocity of savage beasts, the existence of weeds, thorns, and thistles, of ugly toads and venomous serpents, all of these were painful reminders of the irretrievable loss of the paradisaical earth. Even the surface of the globe itself, once a smooth and perfect sphere, had been transformed into hideous vistas of bogs, valleys, ravines, hills, and mountains. In its original, pristine state, the whole earth had been an ordered garden, now it was an untamed and unkempt wilderness, inhabited by a menagerie of mostly unmanageable beasts.⁵⁹

Viewed in this context, early modern discourse about human dominion is not an assertion of a human tyranny over a hapless earth, nor does it exemplify an arrogant indifference to the natural world. Rather, dominion is held out as the means by which the earth can be restored to its prelapsarian order and perfection. It is for this reason that the seventeenth-century discourse of dominion is almost invariably accompanied by a rhetoric of restoration. John Pettus, for example, speaks of "subduing the earth" and "conquering those extravagancies of nature," but his aim is "the replenishment of the first creation." The "extravagancies" to which he refers are those of a nature gone wild and unchecked. Agriculture, which required a clearing of the native vegetation, a levelling of land, and a draining of swamps, was the activity that lay at the vanguard of these projects of restoration. Metaphysical poet Thomas Traherne wrote that the earth "had been a Wilderness overgrown with Thorns, and Wild Beasts, and Serpents: Which now by the Labor of many hands, is reduced to the Beauty and Order of *Eden*."⁶⁰ According to Timothy Nourse, agricultural activities heal the land of "the Original Curse of Thorns and Bryers" thus effecting "the *Restauration of Nature*, which may be looked upon as a *New Creation* of things."⁶¹ In a similar vein, Richard Burton was to write of his ideal estate, "I will have no bogs, fens, marshes, vast woods, deserts, heaths . . . I will not have a barren acre in all my territories, not so much as the tops of the mountains: where nature fails, it shall be supplied by art."⁶² Human artifice compensates for the defects of nature, and fittingly so, for these defects represent the consequences

⁵⁹ For typical accounts of the mutations of the earth and its creatures that resulted from the fall, see Walker, pp. 23–25; Jean-François Senault, *Man Becom Guilty, Or the Corruption of Nature by Sinne, According to St. Augustin's Sense* (London, 1650), pp. 319–90; Richard Franck, *A Philosophical Treatise* (London, 1687), pp. 124–70.

⁶⁰ Thomas Traherne, *Christian Ethicks* (London, 1675), p. 103.

⁶¹ Pettus (n. 51 above), p. 83; Timothy Nourse, *Campania Foelix* (London, 1700), p. 2.

⁶² Quoted in John Hale, *The Civilization of Europe in the Renaissance* (New York: Touchstone, 1995), p. 511.

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of human sin. It is our business, wrote John Donne, "To rectifie nature to what she was."⁶³ Bacon himself wrote that the endeavour "to establish and extend the power and dominion of the human race itself over the universe" was undertaken with a view to enabling the human race to "recover the light over nature which belongs to it by divine bequest."⁶⁴ Dominion, then, was not exercised so that humanity could leave its mark upon the earth. On the contrary, it was to erase those scars that embodied the physical legacy of a moral fall. These measures were intended to improve the earth, to reinstate a paradise on earth, and provide an anticipation of heaven. "A skilful and industrious improvement of the creatures," observed one writer, would lead to "a fuller taste of Christ and Heaven."⁶⁵ The rhetoric of dominion and subjection that we encounter in this period does not therefore betray an indifference to the fortunes of nature but a concern to restore it to its original perfection.

The seventeenth century furnishes us with further evidence that challenges standard accounts of "Christian attitudes towards nature." Many such accounts refer to a connection between anthropocentrism and environmental exploitation. White, for example, maintained that "Christianity is the most anthropocentric religion the world has seen."⁶⁶ While this may be the case, it is by no means clear that anthropocentrism inevitably leads to an aggressive violation of the integrity of nature. As it turns out, the link between anthropocentrism and the early modern exploitation of the natural world is quite different from what we might expect, for the first serious challenges to anthropocentrism in the West come in the seventeenth century.⁶⁷ Many divines and scientists who unambiguously subscribed to a Christian doctrine of creation questioned the prevailing view that the whole of the created order had been brought into existence to serve human beings. Robert Boyle, one of the fathers of modern chemistry, described the idea as "erroneous." William Derham thought it a vulgar error. Fellow physico-theologian John Ray agreed that it was "vulgarly received" that "all this visible world was created for Man," but that "Wise Men now think otherwise." Thomas Burnet, who advocated a kind of seventeenth-century creation science, regarded as absurd the belief that the earth and the myriad celestial bodies were designed for use by "the meanest of all the Intelligent Creatures." Anthropocentrism was an opin-

⁶³ John Donne, "To Sr Edward Herbert. At Julyers," lines 33–34.

⁶⁴ Bacon, *Novum Organum* (n. 38 above), 1.129.

⁶⁵ John Flavell, *Husbandry Spiritualized* (London, 1669), sig. A2v.

⁶⁶ Lynn White, in Barbour, ed. (n. 1 above), p. 25.

⁶⁷ Some pagan writers of the patristic period—most notably Celsus and, later, Porphyry—took issue with the anthropocentric stances of Stoicism and Christianity. See, e.g., Origen, *Against Celsus* 4; Porphyry, *De abstinentia* 3.20, and passim.

ion, wrote Archbishop William King, attended with “inextricable difficulties.”⁶⁸

We do not need to search far to discover the reasons for this challenge. The Copernican hypothesis that had displaced the earth from the center of the cosmos gained increasing support during the course of the seventeenth century. Many critics of anthropocentrism were Copernicans, and some explicitly identified their heliocentric commitments as the reason for their rejection of anthropocentrism. The expansion of the universe that came with the invention of the telescope also called into question the privileged place of the human race. The new astronomy, complained one of its critics, had made the earth “a despicable Spot, a Speck, a Point in comparison of the Vast and Spacious Conjerries of the Sun and Fixed Lights.”⁶⁹ Such an insignificant planet could hardly serve as the home of the creature that was supposedly the pinnacle of the material creation. The passing of the microcosmic conception of the human being as the one creature in which all others were comprehended further eroded the prestige of the human animal. Added to this, the criticism of explanation in terms of final causes, articulated by such influential figures as Bacon and Descartes, removed human needs and purposes from the sphere of scientific explanation.

It is not unreasonable to conclude that during the course of the seventeenth century active engagement with the natural world increased as anthropocentric convictions waned. This development is not as surprising as it may at first seem. Francis Bacon’s notorious advocacy of wresting nature’s secrets from her by force was premised on the view that nature is not a pliant servant, transparent to the intellect and designed to cater for human needs. It is because nature does not readily acquiesce in its own exploitation that force is called for. Nature, wrote Bacon, is to be interrogated and subjected to “trials and vexations of art.”⁷⁰ A number of

⁶⁸ Robert Boyle, *A Disquisition about the Final Causes of Things* (London, 1688), p. 10; William Derham, *Astro-Theology; Or, a Demonstration of the Being and Attributes of God from a Survey of the Heavens* (London, 1715), p. 39; Ray (n. 55 above), pp. 127–28; Thomas Burnet, *The Sacred Theory of the Earth* (1690–91), 2.11 (London: Centaur Press, 1965), p. 218; William King, *An Essay on the Origin of Evil* (London, 1731), p. 91. Also see Henry More, *An Antidote against Atheism*, 2d ed. (London, 1662), appendix, p. 178; Jean d’Espagnet, *Enchyridion physicae reitutatae* (London, 1651), p. 162; Pierre Charron, *On Wisdom* (London, 1697), pp. 365–66.

⁶⁹ John Edwards, *Brief Remarks upon Mr. Whiston’s New Theory of the Earth* (London, 1697), “Epistle Dedicatory,” pp. 23–26. Edwards believed that the Copernican hypothesis was a passing fad. On the connection between final causes and cosmology, also see John Witty, *An Essay towards a Vindication of the Vulgar Exposition of the Mosaic History of the World*, 2 vols. (London, 1705), 1:105, 108–9. Also see Boyle, preface, pp. 32–33, for a comparison of the Cartesian and Epicurean denials of final causes.

⁷⁰ Francis Bacon, *De dignitate*, in *Works*, 4:298. Compare *Novum Organum* 1.98, in *Works*, 4:94.

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his contemporaries agreed. According to Galileo, nature does not care “a whit whether her abstruse reasons and methods of operation are understandable to men.” Robert Hooke thought that nature seemed “to use some kind of art in endeavouring to avoid our discovery.” Thus nature was to be investigated when “she seems to be put to her shifts, to make many doublings and turnings.”⁷¹ It had been a central assumption of Aristotelianism, by way of contrast, that the interpretation of nature could be based on commonsense observations of everyday phenomena. Accordingly, Aristotle and his medieval successors had erroneously concluded that heavy objects will fall faster than light ones, that objects in motion will naturally tend to come to rest, that the apparently circular motions of celestial objects were based on principles fundamentally different from those of terrestrial mechanics. The Aristotelian approach to knowledge of nature thus meshed neatly with the anthropocentric presumption. For seventeenth-century investigators, however, it was precisely because nature had not been framed solely with human utility in mind that an aggressive stance toward it was considered necessary. Robert Boyle thus thought it a mistake to claim that all things in the visible world had been created for the use of human beings, yet he allowed that all things had potential uses that could be determined only through systematic investigation.⁷²

Growing uncertainties about how human interests fitted into the cosmic scheme of things thus combined with the ancient narrative of the expulsion from the garden, now read exclusively in its literal sense, to relocate early modern individuals into an apparently hostile environment in which they must make their own way and painstakingly accumulate knowledge from a world reluctant to yield up its secrets. Whatever the past glories of Eden, whatever easy assumptions of the superiority of the human race had been made in the previous periods of history, the present world was no longer regarded as the place over which human beings exercised a natural superiority, nor did the earth compliantly satisfy intellectual curiosity and provide for the material comforts of its human ten-

⁷¹ Galileo, *Letter to the Grand Duchess Christina*, in *Discoveries and Opinions of Galileo*, trans. Stillman Drake (New York: Anchor, 1957), p. 183; cf. pp. 187, 199; Robert Hooke, *Micrographia* (London, 1665), preface.

⁷² Boyle, p. 10; cf. pp. 230–31. The rise of theological voluntarism is also a relevant consideration here. If the laws of nature rested upon the divine will, rather than the divine reason, the basis of the regularities of nature could only be discovered through empirical investigation and not merely through the exercise of human reason alone. See Richard Westfall, *Science and Religion in Seventeenth-Century England* (New Haven, Conn.: Yale University Press, 1958), pp. 5–7; Richard Greaves, “Puritanism and Science,” *Journal of the History of Ideas* 30 (1969): 345–68; R. Hooykaas, *Religion and the Rise of Modern Science* (Grand Rapids, Mich.: Eerdmans, 1972), pp. 98–114; Eugene Klaaren, *Religious Origins of Modern Science* (Grand Rapids, Mich.: Eerdmans, 1977), pp. 32–52.

ants. It was not arrogance, but modesty, that motivated the first of the modern scientists, and their program was not the violation of nature but the restoration of the earth to a paradise in which all creatures could take their proper place.

v

All of this suggests that some prevalent ideas about the relationship between the Christian doctrine of creation and Western attitudes toward nature require significant revision in a number of areas. First, if White was fundamentally correct to identify in specific Christian ideas and in particular biblical texts powerful determinants of Western attitudes toward the natural world, he was, for all that, mistaken in attributing to these an influence that predated the rise of science in the early modern period. Whatever evidence there may be of human impact on the natural landscape during the Middle Ages, only in the early modern period do we encounter the explicit connection between the exploitation of nature and the Genesis creation narratives.

Second, the common assumption that anthropocentrism is one of the engines that drives the exploitation of nature now seems questionable. For the Middle Ages, the centrality of the human being in the cosmos was unquestioned. For the moderns, it was precisely the loss of this centrality that motivated the quest to conquer an obstinate and uncooperative earth. From the perspective of Francis Bacon and his generation, if the natural world were genuinely to function as a willing vassal for its human masters, its active exploitation would have been unnecessary. Were nature truly submissive—as once it had been in Eden—it would already cater to all human needs. Thus doubts about the cosmic status of human beings motivated the investigation of nature in the search for hitherto hidden utilities. Such considerations furthered the cause of the scientific enterprise and indirectly contributed to environmental degradation.

Third, the role played by the narratives of creation and fall in the seventeenth-century discourses of the domination of nature suggests that the long-standing distinction between the traditions of “stewardship” and “despotism” in the Western tradition might have outlived its usefulness. The key to resolving the apparent tension between the views of the human being as steward or despot—the opposing perspectives of our relation to the natural world supposedly inherent in the Judeo-Christian tradition—lies in the conception of nature to which our early modern counterparts subscribed. For them, the world in its virgin state, untouched by human industry, was not the “natural” world but a fallen and disfigured creature, a standing rebuke to human sin and idleness. Accordingly, their responsibility, as they perceived it, was not to leave the

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world in its fallen state but rather to manipulate it, to improve it, to experiment upon it, all with a view to restoring it to its original perfection. In carrying out such activities they sought to redeem nature from the curse to which it had been subject for centuries on account of our first father's disobedience. In an important sense, then, early modern advocates of dominion and contemporary environmentalists share a common concern—to preserve or restore the natural condition of the earth, with the crucial difference between them residing in their respective views of what that “natural condition” is believed to be. What is certain is that, during this period of history at least, the impulses of dominion and stewardship were directed toward a common goal.

Finally, and following on directly from the previous point, it might be said that in these early modern understandings of creation and fall are the resources for an ecologically sensitive theology. It is intriguing, then, that so many advocates of ecotheology have tended to regard traditional theology as the problem rather than the solution.⁷³ Thomas Berry, one of the leading Catholic thinkers in this field, thus observes that our environmental problems are to be attributed at least in part to “our identification of the divine as transcendent to the natural world.” What is required instead, he suggests, is “a new type of religious orientation.”⁷⁴ Sally McFague, who has sought to articulate new models of God more congruent with contemporary ecological sensitivities, has likewise criticized the theological stance according to which God is “distant from the world and relates only to the human world.” It is this “image of sovereignty” that “supports attitudes of control and use toward the nonhuman world.”⁷⁵ Perhaps most directly relevant of all for our present discussion is Matthew

⁷³ See, e.g., H. Paul Santmire, *The Travail of Nature: The Ambiguous Ecological Promise of Christian Theology* (Philadelphia: Fortress Press, 1985), pp. 146–47, “Healing the Protestant Mind: Beyond the Theology of Human Dominion,” in *After Nature's Revolt: Eco-Justice and Theology*, ed. D. Hessel (Philadelphia: Fortress Press, 1992), pp. 62–63; William French, “Subject-Centered and Creation-Centered Paradigms in Recent Catholic Thought,” *Journal of Religion* 70 (1990): 48–72; Gustaf Wingren, *The Flight from Creation* (Minneapolis: Augsburg, 1971); Frederick Elder, *Crisis in Eden: A Religious Study of Man and Environment* (Nashville, Tenn.: Abingdon, 1970); Sean McDonagh, *To Care for the Earth: A Call to a New Theology* (Santa Fe, N.M.: Bear, 1987); John Carmody, *Ecology and Religion: Toward a New Christian Theology of Nature* (New York: Paulist, 1983); Rosemary Ruether, *Sexism and God-Talk: Toward a Feminist Theology* (Boston: Beacon, 1983); Roderick Nash, *Wilderness and the American Mind* (New Haven, Conn.: Yale University Press, 1970), and *The Rights of Nature* (n. 13 above), chap. 4; John Cobb, *Is It Too Late? A Theology of Ecology* (Beverly Hills, Calif.: Bruce, 1972); Matthew Fox, *The Coming of the Cosmic Christ* (San Francisco: Harper, 1988).

⁷⁴ Thomas Berry, *The Dream of the Earth* (San Francisco: Sierra Books, 1988), pp. 113–15, 87. Intriguingly, White also spoke of a religious solution to our environmental problems, suggesting the revival of the theology of Saint Francis of Assisi, and proposing him as the patron saint of ecologists. See Barbour, ed., p. 30.

⁷⁵ Sally McFague, *Models of God: Theology for an Ecological, Nuclear Age* (Philadelphia: Fortress Press, 1987), p. 68.

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Fox, who in *Original Blessing* (1983) blames “Augustinian fall-redemption theology” for what he identifies as an openly antagonistic approach to the natural world.⁷⁶ In light of the history of various readings of the creation and fall, it seems that such analyses concede too easily the agenda of White and his successors and prematurely abandon traditional Christian understandings of God’s relation to the world. While it is tempting to speculate about simple connections between such ideas as divine transcendence or human dominion on the one hand, and attitudes of arrogance toward the natural order on the other, and while such links may seem to have a *prima facie* plausibility, history bears out the fact that the real situation is rather more complex.

The brief account of some of the dominant early modern readings of the Genesis text that I have provided is admittedly far from complete. Yet it serves to show the inadequacy of commonly held views about the relationship between Christianity and the exploitation of nature. I hope also to have shown that the religious convictions of previous eras are perhaps not as irrelevant to our present predicament as is often claimed. However ecologically naive our seventeenth-century forebears might now appear, and however misguided their efforts to “improve” the natural world, their program of retrieving a nature that had fallen into ruin on account of human transgressions seems not entirely inappropriate for the late twentieth century.

⁷⁶ Matthew Fox, *Original Blessing* (Santa Fe, N.M.: Bear, 1983), pp. 10–11.