

RESOLVING MULTIPLE VISIONS OF NATURE, SCIENCE, AND RELIGION

by James D. Proctor

Abstract. I argue for the centrality of the concepts of biophysical and human nature in science-and-religion studies, consider five different metaphors, or “visions,” of nature, and explore possibilities and challenges in reconciling them. These visions include (a) evolutionary nature, built on the powerful explanatory framework of evolutionary theory; (b) emergent nature, arising from recent research in complex systems and self-organization; (c) malleable nature, indicating both the recombinant potential of biotechnology and the post-modern challenge to a fixed ontology; (d) nature as sacred, a diffuse popular concept fundamental to cultural analysis; and (e) nature as culture, an admission of epistemological constructivism. These multiple visions suggest the famous story of the blind men and the elephant, in which each man made the classic mistake of part-whole substitution in believing that what he grasped (the tail, for example) represented the elephant as a whole. Indeed, given the inescapability of metaphor, we may have to admit that the ultimate truth about the “elephant” (nature, or the reality toward which science and religion point) is a mystery, and the best we can hope for is to confess the limitations of any particular vision.

Keywords: biotechnology; culture; emergence; evolution; metaphor; nature; religion; sacredness; science.

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So oft in theologic wars,
 The disputants, I ween,
 Rail on in utter ignorance
 Of what each other mean,
 And prate about an Elephant
 Not one of them has seen!

—John Godfrey Saxe (1816–1887)¹

THE CHALLENGE: MULTIPLE VISIONS

John Godfrey Saxe may or may not have known much about elephants, but he certainly knew a great deal about people. In technical terms, what Saxe (and the originators of the story in India and China) understood was the human propensity to commit the error of part-whole substitution, in which we mistakenly infer global truths from our local experiences.

Consider recent concepts of biophysical and human nature, which differ as much as would concepts of an elephant based solely on one part of the elephant—say, the tusk, tail, or ear—as recounted in Saxe's poetic rendition of the famous story. These divergent concepts of nature, all bearing the traces of distinct intellectual points of departure, challenge us to consider how they may be harmonized or may suggest that a more comprehensive vision of nature will prove as elusive as the elephant did to the blind men.

How does this matter for science and religion? A great deal; visions of both external (biophysical) and internal (human) nature have been at the heart of theories of science and religion from Thomas Aquinas to Isaac Newton and continuing in notable contemporaries such as Ian Barbour (1997), John Polkinghorne (1991), and Holmes Rolston, III (1999). In addition to strong scientific interest in external and internal nature, questions of human nature are found in all major religious traditions (Ward 1998), and concerns regarding biophysical nature have emerged in many religions as well (Tucker and Grim 2001).

Recent scholarship on biophysical and human nature may have major implications for our understanding of science, religion, and their relationship, but it needs to be synthesized and systematically applied to science and religion alike. There are obstacles to be overcome, as visions of nature have both united and divided science and religion. In its reference to the biophysical world, nature has been invoked by scientists to reject religious or supernaturalistic explanation, but it also serves as a common sacred ground for theologians and scientists oriented toward ecospirituality. In its reference to human nature, the concept has been used to explain everything from the theological doctrine of sin to the biological basis of religion. Nature plays a central role in policy concerns of our time yet still

unites and divides science and religion. Consider, for instance, the 1991 joint statement signed by leading scientists and religious leaders declaring their common concern for environmental protection,² versus the ongoing dispute—with significant scientific and religious dimensions—over human cloning. In short, resolution of the question of science and religion necessitates resolution of the question of nature as well; in doing so, new visions of nature, science, and religion may result.

NATURE, SCIENCE, AND RELIGION

The term *nature* comes from the Latin *natura*, which is derived from the verb “to be born” (*natal* comes from the same root). There have been three progressive senses of the English use of the word *nature* through time (Williams 1983). From the thirteenth century on, *nature* meant the essential quality or character of something, such as the nature of a person or of mortality. Beginning with the fourteenth century, the word was also used to represent the inherent force directing the world and human beings, as in “the way of nature.” Not until the seventeenth century—relatively recently in English language usage—did the word *nature* also mean the physical world as a whole. Thus it spans a wide variety of meanings in reference to both human beings and biophysical reality.

Nature is a much-abused word today, conjuring up images of untrammeled wilderness far removed from both scientific research and religious institutions. Yet the question of nature has been at the heart of science-religion dialogue for centuries, and it is no accident that the term has entered into the titles of important historical works such as *God and Nature: Historical Essays on the Encounter between Christianity and Science* (Lindberg and Numbers 1986) or *Reconstructing Nature: The Engagement of Science and Religion* (Brooke and Cantor 1998). Barbour considers nature as historically central to the integration of science and religion, as understood in two distinct ways: natural theology and theology of nature (Barbour 1997, 98–103). *Natural theology* refers to arguments concerning God’s existence and properties based on empirical inquiry into biophysical nature: nature is a book of God’s works, and thus natural science can tell us about God. A *theology of nature*, according to Barbour, is built on religious tradition but is open to changes in light of natural science, including scientific discoveries about reality and scientifically based environmental concern.

Nature also figures centrally in contemporary discussions of science and religion. Witness, for example, recent issues of *Zygon* in which religious naturalism and “theology coming to terms with evolution” were organizing themes, or annual conferences of the Institute on Religion in an Age of Science (IRAS), with recent themes including “Ecomorality” (2003), “Is Nature Enough? The Thirst for Transcendence” (2002), and “Nurturing Human Nature” (2000).

Despite this wave of interest, the vast majority of these efforts have been limited to selected scientific or religious metaphors or visions of nature (e.g., those adopting an evolutionary theme). A greater spectrum of visions exists and must be included if we are to fairly assess their potential for reconciliation, perhaps even integration, in the future. Five visions are considered in this article: evolutionary nature, emergent nature, malleable nature, nature as sacred, and nature as culture. The first two of these visions have arisen in the physical, life, and behavioral sciences and the final two in the social sciences, humanities, and theology, with malleable nature straddling the sciences and humanities. Taken together, these visions represent a broad, balanced scholarly approach toward reconciling nature, science, and religion. Yet, given this breadth, these visions overlap but do not immediately fit together; similarly, all have important but somewhat different implications for progress in science and religion. Hence, the overriding need is to explore means of dialogue and possible synthesis.³

EVOLUTIONARY NATURE

The evolutionary vision of nature is the predominant contemporary scientific means of addressing questions of the origin and diversity of life, with important parallels to scientific theories of the origin and development of the universe. It links biophysical and human nature in a common naturalistic explanatory framework. Though its supposed challenges to traditional religious belief are well known, it may pose new theological insights for spirituality. It also may help us reflect on and reevaluate some of science's basic metaphysical assumptions.

Evolution is an ancient idea, but the evolutionary vision of nature derives primarily from one of the most far-reaching and influential works in the history of science: Charles Darwin's *Origin of Species* (1859). Beginning with the publication of Darwin's work in the mid-nineteenth century and continuing through the twentieth-century modern synthesis with population genetics all the way to contemporary research, the evolutionary vision of nature has played a powerful integrative role among life scientists.

Evolutionary theory is far from settled, which is understandable given its considerable power and breadth of explanation. One of its most celebrated recent interpreters, Stephen Jay Gould, released soon before his death a magnum opus on evolutionary theory, reconsidering the basic questions of whether (a) natural selection is the primary mechanism of adaptation, (b) natural selection operates at the genetic, organism, and/or group level, and (c) changes induced by evolutionary mechanisms are incremental or sudden (Gould 2002). Yet Gould's take on evolution stands in sharp contrast to that of Richard Dawkins, for whom genetic selection is paramount and the lessons of evolution apply equally to humans and nonhumans (Sterelny 2001). Dawkins's strident position on genetic selection is

opposed by more scientists than just Gould; biologist Ernst Mayr also recently rejected implications of genetic reductionism (Mayr 2001).

The discussion is equally vigorous when evolution is applied to human nature. Psychologist Leda Cosmides and anthropologist John Tooby have pioneered a new field called evolutionary psychology, an approach in which knowledge and principles from evolutionary biology are put to use in research on the structure of the human mind (Barkow, Cosmides, and Tooby 1992). Cosmides and Tooby have derived results for behaviors as wide-ranging as cooperation, love, incest, and racism. However, biologist Paul Ehrlich (2002), a staunch defender of evolutionary theory, argues that it is primarily cultural evolution rather than biological evolution, environment rather than genes, that is responsible for human behavior. These contrasting positions have been somewhat reconciled in the integrationist account of biologist Jeffrey Schloss (2002), who brings evolutionary nature into dialogue with culture in order to explain human altruism.

There are strong philosophical parallels in accounts of the evolution of life and the evolution of the universe. Both are answers to fundamental origins questions. Both have traditionally involved recourse to a deity, whether as a Prime Mover or an involved God. But scientific theories have been advanced by some to suggest that the notion of a deity is unnecessary, perhaps even impossible. It is this thoroughgoing naturalism (or, rather, anti-supernaturalism) that has united certain proponents (see Stone 2003). For instance, Steven Weinberg has linked evolutionary and cosmological theory as part of a historical process of scientific “demystification” that ultimately suggests “a chilling impersonality in the laws of nature” (Weinberg 1992, 245).

It is a popular assumption that the evolutionary vision of nature poses a direct threat to religion, and debates over evolution versus creation (or intelligent design) have persisted to the present (Ruse 2000; Pennock 2001). Considerable attention has also been directed to resolving this perceived conflict, generally by reassessing the theological underpinnings of religion and the philosophical underpinnings of science (Ayala, Russell, and Stoeger 1998; Griffin 2000).

Evolutionary nature has been seen as a threat by some scholars in the social sciences and humanities as well. As one example, E. O. Wilson’s *Consilience* (1998) argues for a unity of knowledge based largely on the natural sciences, in particular a model of human nature based on biological evolution. This model predictably finds mixed support in the scholarly community (Berry 2000; Damasio 2001).

In summary, evolutionary nature is a powerful, sweeping vision of biophysical and human nature with significant implications for the relationship between science and religion, and the sciences and the humanities. These implications are far from resolved. Evolutionary nature will thus likely play a lead role in reconfiguring science and religion in the future.

EMERGENT NATURE

A major scientific understanding of biophysical and human nature hinges on emergence, which has been invoked to explain complex phenomena ranging from biological diversity to human consciousness. Emergent nature is becoming a unifying vision for a vast array of scientific disciplines and sheds new light on traditional metaphysical questions of order and chaos, parts and wholes. Emergence also has been offered as a way to situate theology in a scientifically valid framework.

Emergent nature champions antireductionist explanation. It has been recognized throughout the ages that nature exists at multiple scales of complexity; what is the relationship between these levels? The perennial Great Chain of Being (Lovejoy 1936) posited a vast hierarchy running from matter to spirit, joining levels of complexity (and, significantly, science and religion), with higher levels ultimately explaining lower levels. However, many of the sciences, especially in the last century, have moved in the opposite, reductionist, direction, seeking explanation at smaller and smaller levels of reality.

A good example is physics, which arguably encompasses a broader range of scales of complexity than any other science does. A well-known advocate of reductionist explanation is Weinberg (2001, 107–22), who believes that complex phenomena such as mind and life do emerge out of simpler systems, yet “The rules they obey are not independent truths, but follow from scientific principles at a deeper level” (p. 115). Reductionist explanation has generally been the hallmark of physics but has not gone without criticism. A key early paper was written by condensed-matter theorist Philip Anderson in an essay aptly titled “More is Different” (1972). One of Anderson’s main points is that “The ability to reduce everything to simple fundamental laws does not imply the ability to start from those laws and reconstruct the universe” (1972, 393). The early work of Anderson and other physicists has recently led to a burgeoning new cross-disciplinary field of complex systems analysis (see, for example, *Science*, 2 April 1999), which is explicitly devoted to establishing nonreductive modes of explanation of complex phenomena. This interest has spawned research centers such as the Santa Fe Institute and the New England Complex Systems Institute, with significant participation by physicists such as Murray Gell-Mann (1994).⁴

Complex-systems research has led to new ways of understanding the age-old question of the relationship between order and disorder in reality, leading to fundamental insights on nature, classically understood as part of an orderly cosmos. Pivotal to this work has been the concept of deterministic chaos, in which apparent disorder emerges from very orderly simple rules, yet this emergent disorder turns out to be quite orderly in other ways. These attributes of chaos are well known, having been popularized over the last fifteen years, and have been extended to science and theology

(Prigogine and Stengers 1984; Gleick 1988; Peitgen, Jürgens, and Saupe 1993; Murphy, Russell, and Peacocke 1995). The vision of emergent nature thus challenges the strict separation of cosmos and chaos, order and disorder in the universe. In emergent nature, randomness and pattern are linked. This very different metaphysical way of looking at nature has led to fundamental new insights in natural science fields such as ecology (May 1973; 1995; Levin 1992; 1998; 1999; Ulanowicz 1997; 1999).

Perhaps the most breathtaking recent publication on emergent nature is *The Emergence of Everything* (Morowitz 2002). In this work biophysicist Harold Morowitz assembles a continuum of twenty-eight steps of higher levels of emergent complexity rivaling in scope the classical Great Chain of Being and running from the universe to planets to cells to animals to humans to culture to spirit. Morowitz ascribes much of the recent flurry of scientific discovery around emergence to the advent of high-speed computing, which has presented new opportunities for modeling complexity in nature. Major implications exist for science as it potentially moves from mathematical to algorithmic modes of explanation (e.g., understanding the emergence of complex behaviors based on simple computational models such as cellular automata), as championed in Stephen Wolfram's *A New Kind of Science* (2002).

Morowitz's work reaches beyond science to religion in tracing implications of this vision of emergent nature. He advances the radical theological thesis that "Transcendence is an emergent property of God's immanence. . . . We *Homo sapiens* are the mode of action of divine transcendence" (2002, 195). According to the vision of emergent nature, Morowitz claims, God is to be understood as the immanent laws of nature, and human beings, who possess emergent consciousness, are the true transcendent agents in the cosmos. Others have discussed theological implications of emergence with varying degrees of departure from traditional theism. John Polkinghorne (1991) has considered implications of chaos, complexity, and emergence, linking God with the possibility of top-down causation between levels of reality. Philip Clayton's *The Emergence of Spirit: God Beyond Theism and Physicalism* (forthcoming) argues that emergence theory in recent science offers an important opening for language about the spiritual dimension of human existence, including the concept of spirit and perhaps even the idea of God. He traces emergentist arguments from the emergence of the classical world out of quantum mechanics through contemporary debates in evolutionary biology and neurophysiology and up to the emergence of spirituality and metaphysical concepts.

Emergent nature is thus in many respects an even more wide-sweeping vision than evolutionary nature. It is quite recent, may signal major changes in science, and has afforded diverse theological interpretations. Its stronger scientific advocates have not, however, escaped criticism for their ambitious extension of this vision (see Kadanoff 2002). In its theological

extensions, emergence, if not carefully articulated, can become an inspiring but fuzzy God-of-the-gaps argument; indeed, its popularity in certain new religious movements bears little resemblance to its scientific origins.⁵ However, these theological extensions suggest ways in which contemporary visions of nature can have significant spiritual dimensions, to be explored later under the cultural and philosophical vision of nature as sacred.

MALLEABLE NATURE

The vision of nature as malleable straddles the sciences and the humanities. It arises in the sciences and engineering from pathbreaking research in genetics and development of new genetic technologies over the last several decades (Keller 2000) and has arisen in the same time period in the humanities in association with poststructural and postmodernist perspectives on the nature of reality and human beings (Robertson et al. 1996; Castree and Braun 2001). The vision of malleable nature challenges the boundaries of nature and the natural, because what lies beyond these boundaries—the unnatural, the artificial—is now less easily distinguishable from the realm of nature. As such, it also challenges the bedrock of biophysical and human nature upon which many societal and religious values are based (Lustig 2002; Deane-Drummond, Szerszynski, and Grove-White 2003) and has thus engendered serious discussion and debate over its philosophical, theological, and political implications. Yet this debate may lead to new, more subtle, less simplistic understandings of religion-and-science.

Malleable nature encompasses a wide swath of related topics, including human reproduction and enhancement (Paul 1998), genetic discrimination (Carlson 2001), human stem-cell research (Holland, Lebacqz, and Zoloth 2001), and food and agriculture in developing countries (Paarlberg 2001). But positions taken on these topics by scientists, religious leaders, industry, and the public have been relatively few, reminiscent of the polar “catastrophist” versus “cornucopian” stances Stephen Cotgrove detected in environmental politics some two decades ago (Cotgrove 1982). On the catastrophist side, a number of religious denominations, environmental organizations, and sectors of society have denounced biotechnology as an immanent threat to humanity and the natural world; on the cornucopian side, advances in genetic research and biotechnology have been heralded by many scientists and industry as a panacea for problems ranging from birth defects to global food supply.

Much of this academic and popular discussion has focused on developments in science and technology, ranging from the Human Genome Project (Sloan 2000) to current government-sponsored biodefense projects.⁶ Proponents address public anxieties regarding risk in contemporary nature-society relations (for example, pesticide-dependent industrial agriculture) and invoke larger values concerning the proper place of humans in the natural world in casting biotechnology as a safe human improvement upon

nature (Levidow 1996). Similarly, opponents (for example, Rifkin 1998) typically invoke potential environmental risks coupled with societal disempowerment as human and biophysical nature becomes corporatized.

In a broader context, these developments have been examined in terms of implied features of science and its connections with larger political and economic processes. Peter Dickens argues that genetic research and technology treat biophysical and human nature as mechanisms comprising subsystems comprising parts that ultimately boil down to bits of information in the genetic code (1996, 107ff.). To Dickens, this fragmented idea of nature serves well its commodification in multiple market niches: Nature is stuff that can be manipulated to presumably human, and certainly corporate, benefit. Others similarly link genetic research with the increasing emphasis on profitable information in science (Haraway 1997) as witnessed in the rapid rise of molecular biology.

One important issue concerns the appropriate role of public involvement in what is arguably a complex, highly scientific issue. On one side are concerns that religious groups and the public have inappropriately forestalled benefits to be realized from genetic research and technology (see Green 2001), and on the other are concerns that science, industry, and government have not taken seriously some important complexities raised by the lay public (Grove-White et al. 1997; Grove-White, Macnaghten, and Wynne 2000). In response to public opposition and religious concern, the biotechnology lobby has invested in information campaigns, such as that by the Council for Biotechnology Information, designed to convince the public of its benefits.⁷ Similarly, government has attempted to provide information and forums for public input on biotechnology in countries such as the United Kingdom, and watchdog organizations such as the Council for Responsible Genetics and the Center for Genetics and Society have provided their own resources on biotechnology.⁸

Malleable nature is not wholly restricted to the sciences. In the humanities and popular culture, a related discussion has considered malleable nature from a poststructural and postmodernist perspective. Jean Baudrillard, for instance, has argued that the malleable human genome erases the boundary between natural and artificial, real and virtual; there is no reality beyond our "Disney World" representations of it (Baudrillard 1996). And, although some have warned of the dangers of treating human biology as infinitely malleable (Fukuyama 2002), others have pointed out the historicity of supposedly biological concepts such as *woman* in arguing for an embrace of postmodern difference in biotechnology (Oudshoorn 1996). The upshot of these critiques has been a rejection of appeals to "nature" or "natural" in justifying policy and morality.

The theological response to biotechnology has been varied, and only partially advanced (Chapman 1999); its ambivalence mirrors earlier theological challenges by technology (Brooke 2003). Some, like Ted Peters

(2003), have argued for a cautious embrace as humans adopt a future-oriented outlook as responsible partners in God's creation. Others have sounded a note of concern over genetic reductionism and depersonalization implicit in a good deal of biotechnology and related evolutionary theories (Rolston 1999; Peacocke 2003). There has been a clear concern expressed about genetic discrimination (World Council of Churches 1989), though genetic research also has introduced conflicts among communities of faith as biological considerations have made their way into major moral debates such as that over homosexuality (LeVay 1994). One review suggests that the religious response to biotechnology has largely involved a consequentialist focus on impacts instead of a deeper examination of "the profound challenges to human beings' self-image, and to their relationships with one another and with the natural world" (Deane-Drummond, Szerszynski, and Grove-White 2003, 34).

In sum, much discussion concerning biotechnology has taken science and religion as givens rather than provoke a deeper examination of implications of malleable nature for the very science that studies it and religious bodies that comment on it. Preliminarily, biotechnology paints a mixed picture of contemporary science in which religion has not advanced far beyond a simplistic reading of both nature and science. Still, malleable nature is an unsettling notion, in the same way that poststructural and postmodernist notions of malleable reality are unsettling. Malleable nature is therefore both sweeping and inconclusive in its implications for science and religion and must be situated in the context of other visions of nature in order to derive robust indications for future progress in religion and science.

NATURE AS SACRED

In contrast to the notion of biophysical and human nature as thoroughly material entities distinct from the sacred realm of God or spirit, a more theological vision of external and internal nature has recently arisen in both scholarly and popular circles. This vision of nature, with variants running from theistic ecospirituality to agnostic religious naturalism, may serve as an important metaphysical basis governing ethical behavior, but it raises major challenges for reconciliation with both transcendent religion and scientific rationality.

Scholarly attention has been empirical (involving historical and contemporary studies of concepts of sacredness in nature and sacred space) and philosophical and theological (attempting to systematize this empirical information and understand it in light of religious teachings and sacred texts). As an example of the latter, Barbour has incorporated themes of stewardship, celebration, sacrament, and the Holy Spirit into a theology of nature (Barbour 1997, 102–3). An example of the former is the Forum on

Religion and Ecology at Harvard University, a major cross-cultural project involving a multiyear series of conferences and related publications.⁹

In the American context, Catherine Albanese has identified a perennial “nature religion” in the United States stretching from early settlement to contemporary spirituality (Albanese 1990; 1993; 2002). To Albanese, the Western religious tradition “has placed nature near the top of its short list of major categories by which to make sense of religion. God and humanity [as expressed in organized religion and civil religion] comprise the first two categories. Nature, however culturally diffuse and evanescent, forms the third” (Albanese 2002, 3). Albanese notes four expressions of nature religion in American history: the Transcendentalist legacy inherited by contemporary environmentalism, metaphysical forms of spiritualism (e.g., Theosophy) reaching to contemporary New Age practices, a revitalized emphasis on bodily healing and well-being grounded in nature, and Enlightenment-style natural religion and natural theology, expressed in peculiarly American forms such as pragmatism (Albanese 2002, 11–24). Thus both biophysical and human nature fall under this broad rubric.

Albanese’s historical work is validated by contemporary social-science research. In a three-year research project exploring the scientific and religious dimensions of contemporary American environmentalism, I followed up on preliminary findings from the 1993 U.S. General Social Survey in which nearly one in four Americans preferred the statement “Nature is spiritual or sacred in itself” (immanent sacredness) to “Nature is sacred because it is created by God” (transcendent sacredness, a position with strong affinities to Western religion) and “Nature is important, but not spiritual or sacred” (nonsacredness, a position bearing affinities to the recent scientific worldview).¹⁰ I developed a two-factor scale of attitudes regarding sacredness in nature based on six statements derived from a pilot survey including fifteen candidate statements. Results of a survey completed by over one thousand adult American respondents in 2002 suggest that American attitudes of transcendent sacredness and nonsacredness are in opposition to each other but statistically separate from immanent sacredness, which enjoyed relatively strong support from a diverse group (Proctor and Berry in press). The vision of nature as inherently sacred thus cuts across many of the more traditional scientific and religious boundaries in contemporary American attitudes toward nature. Preliminary results from a 2000 International Social Survey Programme module which included the 1993 statements, administered in thirty-eight countries worldwide, suggest significant country-specific patterns of support for transcendent sacredness versus nonsacredness but generally strong support for immanent sacredness.

A much more voluminous literature has been devoted to philosophical and theological dimensions of the vision of nature as sacred (Barnes 1994; Gottlieb 1996; Nasr 1996; Cooper and Palmer 1998; Hessel and Ruether

2000; Tucker and Grim 2001; Crosby 2002; Fern 2002; Kellert and Farnham 2002; Matthews, Tucker, and Hefner 2002; Peters 2002). This literature is quite diverse, mixing immanent and transcendent sacredness and exploring related practices in multiple religious traditions. Much of it constitutes a continuing response to Lynn White's famous thesis that the roots of environmental crisis lie in Judeo-Christian attitudes of domination over nature (White 1967), but some of this literature traces implications for human as well as biophysical nature.

What are the implications of the vision of nature as sacred for science and scientific rationality? Scientific opinion is apparently mixed. Some have strongly supported this vision as a mode of reenchancement of the natural sciences (Barlow 1997; Goodenough 1998), whereas others have charged that it constitutes a "betrayal of science and reason" (Ehrlich and Ehrlich 1996), an "assault on reason" (Lewis 1996), or "nature worship" (Budiansky 1995, 41–43). This discussion suggests different positions on the boundary between science and religion, and many of these contradictions have yet to be resolved. The vision of nature as sacred is thus quite culturally diffuse and important among theologians, humanists, and social scientists and will surely play an important role in science-religion dialogue. But more scholarly attention is needed to systematize and join its empirical and philosophical/theological dimensions and to rectify potential contradictions with science.

NATURE AS CULTURE

A diffuse vision of nature arising in the social sciences and humanities concerns nature as culture. This vision emphasizes nature's inextricable connection with human meaning in contrast to the prevalent notion of nature as entirely separable from culture. As with the other visions, it poses important challenges and opportunities for rethinking science and religion, in this case as human endeavors versus direct conduits to reality and God.

The separation of nature and culture is one of the most deeply ingrained divides in Western thought (Glacken 1967). It can be traced back at least to Aristotle, for whom nature (*physis*) is that which is not made by humans, in contrast to *techné*, that which is of human origin. It underscores ideas of objectivity that arose in the seventeenth-century valorization of scientific rationality, often grounded in nature as an objective referent, as a means of technical ordering of society based on a new, naturalist "religion" (Toulmin 1992). The idea of objectivity forced culture into the diminutive category of subjectivity and forced God into two polar alternatives—as equivalent in status to either the objectively verifiable reality explored by science or the subjective projection of a wishful or oppressed people.

The vision of nature as culture has roots in Kantian philosophy and earlier expressions of idealism, but it is best known for its recent flourishing in opposition to naive notions of objectivism underscoring the practice and interpretation of natural and behavioral science. It often is called social constructivism or the “social construction of nature” thesis (see Hacking 1999) and should be understood as primarily an epistemological assertion concerning our knowledge of nature rather than an ontological assertion concerning the reality of nature itself (Proctor 1998; 2001). Nonetheless, one of the primary tenets of social constructivism is that biophysical and human nature are incomprehensible outside of culturally based knowledge schemes, so the vision of nature as culture cannot be readily dismissed as merely a vision of ideas of nature versus nature itself.

The vision of nature as culture has been primarily championed among the social science and humanities disciplines—those for which culture is a primary category of analysis—and its assertions that reality is as much constructed as apprehended have prompted important reflections among theologians for several decades (Altizer 1962; McFague 1982; Van Huyssteen 1999). Its most vocal opponents have been scholars working in the natural sciences. This debate, known popularly as the science wars, has tended to portray philosophical caricatures of naive realism, asserting the reality and ready knowability of nature, against naive relativism, questioning the truth-value of all scientific knowledge (Gross and Levitt 1994; Gross, Levitt, and Lewis 1996; Ross 1996). Fortunately, an excellent and growing body of scholarly work has refused to accept these polarized terms of the epistemological debate over nature and culture (Simmons 1993; Cronon 1995; Keller 1995; Castree and Braun 2001).

The work of French sociologist of science Bruno Latour may serve as an example of this nonpolarized approach to the vision of nature as culture and its implications for science and religion. Latour’s reframing of science and religion follows from a larger argument he has made about modernity (Latour 1993). Latour detects two contradictory processes at work in modern societies: first, the increasing proliferation of hybrids mixing nature (the physical, “objective” world) and culture (the human, “subjective” world), and, second, the recurrent tendency of purification, which attempts to reinforce the epistemological separation of nature from culture, object from subject. At the very moment in history, in other words, that the science wars seem to pit objectivity against subjectivity, the evidence of complicated intertwinings between the two realms seems unmistakable. Latour’s contention is that objectivity and subjectivity are modern myths that support a whole host of questionable dualisms, many of which refer directly to science and religion as antipodes (Latour 1999).

Latour proposes to replace these dualistic terms with blended ones, for example the notion of “factish” (combining fact and fetish), which implies that both scientific knowledge and religious belief are fabricated but must

be well fabricated in order to be epistemologically or morally defensible. Science, to Latour, is a craft constructing knowledge of reality; but not just any construct will do, as all scientists know. The operative question to Latour is not "Is it real or is it constructed?" but "Is it constructed well enough to become an autonomous fact?" (Latour 1999, 274). Latour's analysis points out the structural similarity between typical scientific and religious authority. Whereas both are defended in terms of their ostensible autonomy from human construction, to Latour both could be more realistically defended in terms of how well constructed their truths are, acknowledging the relatedness of subject and object as a necessary precondition, not an inevitable weakness.

The vision of nature as culture, then, resonates with a diffuse epistemological position characterizing many of the social sciences and humanities. It has been understood by some as standing in fundamental opposition to science, but it need not be, as long as dualistic caricatures are rejected. On the contrary, this vision poses a powerful means of potentially reconciling the "two cultures" problem of the sciences and humanities (Snow 1987) and bears important potential for bringing science and religion together.

COMPARISON AND SYNTHESIS

Each of the five visions of nature summarized here has significant implications for rethinking science, religion, and their relationship. Even more far-reaching implications are possible if these five visions can be brought into closer dialogue, possibly synthesis. As powerful as they are, their very multiplicity implies their limitations; none can be truly comprehensive unless all are somehow included. To again invoke the story of the blind men and the elephant, we must now attempt to grasp the nature of the elephant itself and not stop at the powerful, differing accounts of its ear, its trunk, its tusk, and its tail. There is an important unity to nature and the reality embraced by science and religion, which we must strive to understand further by bringing these visions into conversation with each other.

There are some important similarities in these visions. All are strong arguments concerning nature in its entirety, not weak arguments concerning certain properties of nature. For example, the evolutionary vision attempts to explain all life, not just certain of its forms or aspects, through the optic of evolution. Similarly, the vision of nature as culture maintains that all knowledge of nature is filtered through cultural lenses, including scientific as well as popular understandings. This common feature poses challenges for synthesizing these visions, as none necessarily includes room for the others. Yet what may arise could be something entirely new for nature, science, and religion.

As strong arguments, each of the five visions challenges a prevalent metaphysical dichotomy. The evolutionary vision stresses the continuity of all nature and, hence, opposes the notion that humans are entirely separate

from nature. The emergent vision not only challenges the reductionist notion that nature at all scales of complexity can ultimately be analyzed in terms of its constituent pieces but, more fundamentally, revisits the larger opposition between chaos (disorder) and cosmos (the order of nature). The malleable nature vision challenges the dichotomy between natural and artificial in that genetic manipulations of nature are arguably both. The vision of nature as sacred challenges the distinction between matter (the stuff of which nature is ostensibly composed) and spirit, secular and sacred. The vision of nature as culture challenges the same notion questioned by the evolutionary vision but takes the opposite tack by means of “culturizing” nature versus “naturalizing” culture.

These five visions of nature are by no means entirely distinct. There has been a good deal of interest, in particular, in bringing together the two scientifically based visions of evolutionary and emergent nature,¹¹ with important implications for human morality and religion (Goodenough and Deacon 2003). Similarly, the vision of nature as sacred could be understood as a specific claim made by certain cultural groups, thus falling under the vision of nature as culture. In many ways, the vision of malleable nature is the ontological equivalent of the epistemological argument of nature as culture; in one, nature is literally constructed, whereas in the other it is conceptually constructed. Other linkages are possible. Consider the notion of an embodied mind (Varela, Thompson, and Rosch 1993; Lakoff and Johnson 1999), which links the seemingly opposing visions of evolutionary nature and nature as culture, or theological work from an emergentist perspective (Murphy, Russell, and Peacocke 1995; Clayton forthcoming) potentially linking emergent nature and nature as sacred.

Yet there are differences. For instance, the vision of nature as culture can have a corrosive effect on the realist epistemological assumptions underlying evolutionary nature and emergent nature (Hayles 1990; Ruse 1999). Similarly, evolutionary nature may explain, and hence explain away, the vision of nature as sacred (Boyer 1994; 2001; cf. Peters 2002). These differences may suggest important points of departure for a comparative and synthetic effort.

What would science be like, what would religion be like, if we admitted the wisdom of all five visions? These visions point to a biophysical and human nature understood as a consequence of common evolutionary processes, as an emergent reality across multiple scales of complexity, as a complex amalgam of natural and artificial processes, as bearing the sacred features of God or spirit, and as bearing the inescapable features of the cultures that have striven to understand it. If these are some major contemporary visions of nature, what future visions of science and religion may we now imagine that respond to their collective wisdom? This is the very difficult, ambitious, and exceedingly worthy question we must address, remembering that the ultimate reality of nature, science, and religion is probably far

more wonderfully complicated than we will ever be able to grasp. As Sir John Templeton has said in connection with his humble approach in understanding ultimate reality, "Humility [means] admission that god infinitely may exceed anything anyone has ever said of him; and that divinity may be infinitely beyond human comprehension and understanding" (Templeton 2000, 13).

The observations made above do suggest some potential common metaphysical and epistemological characteristics of nature, with important implications for science and religion. At the metaphysical level, nondualism and some form of immanence appear to be preferred over dualism and strict transcendence. At the epistemological level, the twin poles of realism and constructivism yield to a more relational view of scientific and religious truth. This relational view—that truth is not wholly objective nor subjective—helps reframe these visions of nature, science, and religion as inherently metaphorical: as geographer Anne Buttimer has argued (1993), metaphors are powerful, though inescapable, means of apprehending ultimate reality. Ultimately, these potential common features of nature suggest that a science and religion of the future will be built upon a much more integrated metaphysical and epistemological perspective than has existed in the past.

The predicament of multiple visions is faced more generally in the scholarly study of science and religion, given the increasing recognition of plural forms and perspectives. The problem with pluralism is that it is a necessary yet insufficient condition for intellectual progress: at best, it is maximally inclusive of the diverse threads of complex conceptual issues, but at worst it results in a phenomenon of mutual incomprehension. This is precisely the phenomenon captured in the story of the blind men and the elephant.

The Sixth no sooner had begun
About the beast to grope,
Than, seizing on the swinging tail
That fell within his scope,
"I see," quoth he, "the Elephant
Is very like a rope!"

The conclusion to Saxe's poem is appropriate as a conclusion here as well, if only to serve as a guide for what we in the community of science-and-religion scholars should steadfastly avoid. As Saxe summarized:

And so these men of Indostan
Disputed loud and long,
Each in his own opinion
Exceeding stiff and strong,
Though each was partly in the right,
And all were in the wrong!

NOTES

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1. For this rendering, see http://www.noogenesis.com/pineapple/blind_men_elephant.html.
2. See http://environment.harvard.edu/religion/publications/statements/joint_appeal.html.
3. We are doing this at UC Santa Barbara in the context of a new program devoted to this theme. See <http://www.newvisions.ucsb.edu>.
4. See <http://www.santafe.edu>; <http://necsi.org>.
5. See for example <http://anunda.com/enlightenment/spiritual-emergence.htm>; <http://www.sedonajournal.com/sje>.
6. See http://www.ornl.gov/TechResources/Human_Genome/home.html; <http://gene-watch.org/bubiodefense>.
7. See <http://www.whybiotech.com>.
8. See <http://www.aebc.gov.uk>; <http://gene-watch.org>; <http://www.genetics-and-society.org>.
9. See <http://environment.harvard.edu/religion>.
10. See <http://real.geog.ucsb.edu/esr>.
11. Witness, for instance, a special issue of Complexity International at <http://www.csu.edu.au/ci/vol02/ci2.html>.

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