

Science, Religion, and Education

Our ongoing cultural conversation about the relationship between science and religion is much more interesting and important than most educators appreciate, and it strikes Mr. Nord as scandalous that we don't let students in on this conversation.

BY WARREN A. NORD



IN THE BEGINNING, some 10 or 15 billion years ago, was the Big Bang. It was neither good nor evil; it simply was. There was no purpose in the cosmic evolution that followed the Big Bang or in the biological evolution that followed on Earth. Because scientists have as yet been unable to identify sufficient mass in the universe to cause it to contract into a Big Crunch, many believe that the galaxies will continue to expand until they eventually run out of energy and die in the cold darkness of space some hundred billion years from now. It should come as no surprise that we human beings are but a minor detail in this overall scheme of things. As Carl Sagan once put it:

There are cataclysms and catastrophes occurring regularly in the universe and on the most awesome scale. . . . It seems likely that every time a quasar explodes, more than a million worlds are obliterated and countless forms of life, some of them intelligent, are utterly destroyed. This is not the traditional benign universe of conventional religiosity in the West. Indeed, the very scale of the universe — more than a hundred billion galaxies, each containing more than a hundred billion stars — speaks to us of the inconsequentiality of human events in the cosmic context.¹

Students might well wonder if it is reasonable to believe in God if this is the nature of the universe. Or is it reasonable to believe that this is an adequate picture of

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the universe if we do believe in God? Just what is the relationship between science and religion?

The answer, of course, is that we disagree about the relationship. We disagree about how to make sense of nature. We disagree about the fundamental structure of reality. These are controversial matters among intellectuals and throughout our culture generally.

The relationship between religion and science is much more complicated, much more interesting, and much more important for education than the usual debate about evolution and creationism. Defining the nature of this relationship has been one of the most profound intellectual problems of the last several centuries, and there is a vast literature of works by scientists, theologians, and philosophers that address it. Yet this literature is completely ignored in science textbooks and in the recent National Science Education Standards — and it is all but completely ignored everywhere else in the curriculum as well. This is ironic, in that the discussion about science and religion among intellectuals has grown livelier with recent developments in science and theology. This is also scandalous, for it exposes just how shallow our thinking is about matters of some importance.²

The Scientific Revolution

The astronomer Arthur Eddington once told a parable about a fisherman who, after a lifetime of fishing with a net having a three-inch mesh, concluded (falsely, of course) that there were no fish in the ocean smaller than three inches. Eddington's moral was that, just as one's fishing net determines what one catches, so it is with conceptual nets: what we find in the ocean of reality depends on the conceptual net we bring to our investigation. For example, the modern scientific conceptual net — what we call scientific method — allows scientists to catch only replicable events; the results of any experiment that can't be replicated are not allowed to stand. This means that miracles, which are by definition singular events, can't be caught in the net of science. Scientists can't ask God to replicate a miracle for the sake of a controlled experiment. As a result, miracles are ruled out of scientific consideration a priori.

The methods of science require that

evidence for knowledge claims be grounded in sense experience — the kinds of experience that instruments can measure, though this rules out moral and religious experiences as sources of scientific knowledge about the world. And because science doesn't allow appeal to God or to supernatural causes (which, after all, can't be discerned through instruments or sense perception), it cannot make sense of explanations given in terms of design or purposes.

Theologians, by contrast, have long used different kinds of conceptual nets for catching dimensions of reality that, they claim, slip through scientific nets. Within all religious traditions, moral and religious experiences are believed to provide evidence for the existence of a transcendent dimension of reality — that is, for the existence of God. The major Western religions — Judaism, Christianity, and Islam — have made sense of reality not in terms of universal causal laws but in terms of narratives. Events become intelligible not because they are lawlike but because they fit into a narrative (as miracles might). Theologians discern patterns of meaning and purpose in history and nature that they understand in terms of a divine causality in the world.

How reasonable a given claim is — indeed, whether it makes sense at all — depends on the conceptual net or world view that we bring to the discussion. For most of history, the governing world views of humankind have been religious. But in the 17th century scientists began to discard these theologically woven nets in favor of those of modern science. Of course, the great scientists of the scientific revolution were not atheists, and many scientists today believe in God. As it is practiced, however, modern science assumes that God is irrelevant to understanding nature, for scientific method prohibits appeals to miracles, divine purposes, religious experience, or scripture. We teach students to use only scientific conceptual nets to understand nature. And yet students might well wonder whether there is more to reality than these scientific nets can catch.

The Relationship Between Science and Religion

There are four positions that might be taken on the relationship between science and religion.³

1. *Religion trumps science.* When sci-

ence and religion conflict, only religion provides reliable knowledge. It is through inerrant scripture or religious tradition that we come to know the ultimate truth about nature. No doubt good science would always agree with scripture or religious tradition, but, unhappily, not all science is good science. For example, most "creation scientists" begin from the assumption that the truth about nature is to be found in scripture and work to find scientific evidence to confirm what they already know to be true.

2. *Science trumps religion.* When science and religion conflict, only science provides reliable knowledge. It is through the methods of science that we learn the ultimate truth about nature. If the scientific net doesn't catch something, it's because it doesn't exist. Consequently, scientists need not take religious claims into account in constructing their picture of nature. Sometimes this position is called scientism or naturalism or scientific materialism.

3. *Independence.* Properly understood, science and religion can't conflict because they are incommensurable: each has its own methods; each has its own domain. (This is sometimes called the "two worlds" approach.) One common expression of this view is that science asks objective "how" questions, while religion asks personal "why" questions. The conceptual nets of science and religion capture aspects of reality so different that they stand in no logical relationship; they can be true or false in their own terms only. Theology and science can be compartmentalized.

This latter view is, more or less, the orthodox view of science education. For example, according to a 1981 resolution of the National Academy of Sciences (NAS), "religion and science are separate and mutually exclusive realms of human thought whose presentation in the same context leads to a misunderstanding of both scientific theory and religious belief."⁴ The NAS reaffirmed this view in 1998.⁵ According to the National Association of Biology Teachers, science is "necessarily silent on religion and neither refutes nor supports the existence of deity or deities."⁶

Many religious liberals have also taken this position, arguing that scripture was never meant to be a science textbook; its claims about nature simply reflect the fallible prescientific understanding of ancient cultures. Religion is about our existential

situation, not physical reality; it is about the meaning of life, not its chemical composition.

4. *Integration.* The fourth view is that science and religion can conflict and can reinforce each other, for they make claims about the same world. Neither can ignore the other, and neither automatically trumps the other. Because science and religion are each competent to illuminate aspects of the same reality, a fully adequate picture of reality must draw on — and integrate — both.

According to this view, while scriptural passages about nature should not be taken literally, they must still be taken seriously, for they do tell us something important about nature. There is, of course, a theological risk in this position, for it leaves religious claims open to revision, even falsification, by modern science. Still, many theological liberals would agree with Arthur Peacocke, the distinguished biochemist and theologian, that religion and science are “ultimately converging,” in that “the scientific and theological enterprises” are “interacting and mutually reinforcing approaches to reality.”⁷

Over the past several decades there appears to have been something of a shift from the independence to the integrationist position among liberal theologians and even among some scientists. Certainly there is a rapidly growing literature of dialogue. Why? It is often claimed that developments in late-20th-century science — in quantum mechanics, cosmology, chaos theory, and ecology — have made nature a rather more mysterious place, more open to religious interpretation than the old deterministic billiard-ball world of atoms of classical science.

At the same time, many liberal theologians have used models drawn from science to reconceptualize their understanding of God. Historically, liberal theologians have worked to reconcile their religious traditions with modern science and the claims of reason. For them, theology is a critical discipline, and theological claims are testable — though not in quite the same way as scientific claims. That is, theology and science are not nearly as different as has often been believed, and integration has become a possibility.

Evolution

There is a difference between the idea

of evolution and particular theories of evolution. The mere idea of evolution is, of course, anathema to many religious conservatives who believe, given a “literal” reading of the first chapter of Genesis, in a young earth and “special creation” (the claim that God created each species “after its own kind”). Religious liberals, by contrast, have long accepted evolution, reading Genesis mythically rather than literally. Evolution is God’s way of doing things. Indeed, evolution fits nicely into the progressive interpretation of history that has characterized much liberalism. Of course, the biology texts don’t teach that evolution is progressive or that it has a purpose. Instead, they teach the “neo-Darwinian” theory of evolution (the synthesis of modern genetics with Darwin’s theory of natural selection), according to which evolution is the product of natural selection acting on processes of random mutation and genetic recombination.

It is essential to understand that the radical thrust of Darwin’s theory in his own day — and of neo-Darwinism in ours — is not just that it conflicts with a literal reading of Genesis but that it undermines religious conceptions of design or purpose in nature. It makes no scientific sense to say that evolution is the transition from morally or spiritually lower to higher forms of life — as many theologians have wanted to affirm. Human beings are not the end or purpose of evolution, only an “accidental” result. As Stephen Jay Gould recently put it, we are but a minor species in the Age of Bacteria.⁸

This is not a secret. In its official statement on teaching evolution, the National Association of Biology Teachers asserts that evolution “has no specific direction or goal.”⁹ Darwin himself was quite clear about this matter. In his *Autobiography* he wrote that “there seems to be no more design in the variability of organic beings, and in the action of natural selection, than in the course which the wind blows.”¹⁰ No design; no Designer.

There are various moves that theologians can make at this point. Some have adopted the independence position outlined above: because science and religion are incommensurable, evolution has no implications for what is central to religion — its account of the meaning of life.

Others have worked to integrate science and religion, arguing that neo-Darwinism provides only a partial explana-

tion of evolution: there is purpose in nature, but scientific method is too restrictive to allow scientists to consider all the relevant evidence. Orthodox Catholic theology sees a providential God behind the “secondary” causes of evolution, and, while Pope John Paul II recently affirmed the truth of evolution, he warned against “reductionistic” views of it and asserted that evolutionary theory could not account for the development of animals into persons with souls.¹¹

Yet other theologians reject the traditional conception of a transcendent, creator God, arguing instead that God is immanent, a creative and purposeful force working within us and all nature, moving us to higher moral and spiritual planes of existence through evolution. Such positions may be grounded, in part, on revelation and religious tradition, but they may also be advanced as natural theology, in which God is held to be the best explanation for the evidence of design and cosmic progress in evolution. Indeed, advocates of “intelligent design” theories often claim that, on purely scientific grounds, the “irreducible complexity” of nature (in cellular biology, for example) can be explained only in terms of design.¹²

My point in all of this is not to argue that any one view is right. It is, rather, that there are many views and that not all opposition to neo-Darwinism comes from fundamentalists and creation scientists. Indeed, the usual accounts of a polarized division between evolutionists and fundamentalists irresponsibly oversimplify and distort the discussion. And, of course, something important is at stake for liberals as well as conservatives. It makes a difference whether evolution is progressive, whether nature works to fulfill God’s purposes. Hence, the importance of considering the competency of science to give a complete account of nature.

The Relevance of Religion To Other Domains of Science

Cosmology. Most of the controversy over religion and science focuses on evolution, but many other domains of science have religious significance as well. Over the past decade it has become clear that the odds that a life-sustaining universe would result from the Big Bang are almost infinitesimally small. If, for example, the expansion rate after the Big Bang

had been one part in a hundred thousand million million weaker, the universe would have collapsed. But if it had been one part in a million stronger, the universe would have expanded too rapidly for stars and planets to form. Or again, if the strong nuclear force were even slightly weaker, we would have only hydrogen in the universe, but if it were only slightly stronger, all hydrogen would have become helium — and in neither case would stable stars and compounds have formed. These extraordinary “coincidences” can be multiplied many times.¹³ Some cosmologists and theologians see evidence of design here. Might not the most reasonable explanation for this cosmological “fine-tuning” be that God designed the universe in such a way as to eventually “create” life and humans?

While evolution has typically been perceived as a threat to religion, the Big Bang has sometimes been taken by theologians to corroborate the idea of creation. Of course, the idea of a single creation is not found in all religious traditions. Some Hindu texts tell of vast and endless cycles of creation and dissolution, and the Buddha was agnostic about creation. Judaism has resisted systematic attempts to develop an “orthodox” cosmology. The idea of creation was written into the Christian creeds, however, and acquired considerable theological importance.

There are two ways of understanding creation (and of reading Genesis) in the Christian tradition. In the first way, God created the world out of nothing (perhaps by way of the Big Bang): creation *ex nihilo*. In the second, God created order out of existing chaos and continues to create (perhaps through evolution): creation *continua*. As the physicist and theologian John Polkinghorne once put it, God has no “vested interest in beginnings” but “is the God of all times and all places.”¹⁴ What is important is that, in either of these creationist accounts, the existence and shape of the universe are ultimately explainable in terms of God. Neither the Big Bang nor cosmic evolution is a brute fact. Scientific accounts are, at best, incomplete — and those accounts might get the ultimate causality wrong.

For many theologians and scientists, science and religion are radically different kinds of endeavors, and for them cosmology is irrelevant to theology. Yet for an increasing number of theologians and scientists, the Big Bang and the evidence

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for a “fine-tuned” universe do have theological relevance. *Newsweek*, *Time*, *U.S. News & World Report*, and the *New Republic* have each run cover stories in recent issues on this seeming convergence of science and religion.

Ecology. Over the last several decades, a vast theological literature has appeared dealing with ecology, the environmental crisis, and nature more generally. Much of it advocates stewardship as the fundamental virtue of an adequate environmental ethic and mines the Bible for examples of God’s care for nature. We are obligated to care for nature, not simply because it is in our long-term self-interest to do so, but because reverence for nature is the appropriate human response to God’s creation. The world is the Lord’s — not ours to do with as we will.

Some liberal theologians take an even stronger position, arguing that nature must be understood in religious categories. The work of Alfred North Whitehead and of the process theologians who follow him has been particularly influential, as have been various forms of “creation spirituality” developed by Matthew Fox and Thomas Berry. These theologians have extended our conception of God’s action from a largely historical to a broadly cosmic context; the story of God is the story of the evolving universe, understood as having a spiritual dimension.

Ecofeminist theologians have argued that the creator God of the Bible (a disembodied mind who speaks with power and authority) is conceived in narrowly masculine terms. They would replace this transcendent (male) God with an immanent God who speaks to us from within. Some have suggested that we might reconceive nature as God’s body.

Much ecological theology has been influenced by non-Western religions that have placed a much greater emphasis on the sacrality of nature than have Judaism and Christianity. Within Native American and African religious traditions, nature embodies those spirits and divinities that the monotheistic traditions excoriated, and within Eastern religions — particularly Hinduism and Taoism — all of reality is understood as being in some sense one with God or the Divine. These traditions have been much less anthropocentric than have the Western traditions. Individuals are but a small part of reality, not its masters, and we are intimately related to all of nature, with which we must live in harmony.

Other domains of science. Or consider several other areas in which science and religion may overlap or conflict. From within the technological ethos of modern civilization we tend to reconceptualize moral and spiritual problems as technological issues: environmental protection is a matter of clean energy rather than of simpler lifestyles and social justice; sexual responsibility is a matter of condoms and birth control pills rather than of chastity and virtue.

And, of course, health is a matter of high-tech medicine rather than of prayer or living well. And yet, over the past several decades, the role of the mind (or the soul) in health and healing has become more fully appreciated, even within the medical establishment, where major medical schools now sponsor conferences on spirituality and healing.

Some theologians and philosophers have even held that quantum mechanics has implications for free will. There is considerable discussion about whether evolutionary psychology can account for the development of morality. Controversies about the relationship of the brain and the mind (or the soul) continue. Some theologians believe that chaos theory provides room for divine action in nature. There continues to be disagreement about whether

science can account for the origins of life from inanimate nature. Recent advances in cloning make moral and spiritual issues that relate to genetic engineering (and “playing God”) urgent.

Science Textbooks and the National Science Standards

I recently reviewed 12 commonly used high school science texts (five in biology, four in earth science, and three in physics) to see how they dealt with religion, if they did so at all.¹⁵ While each text began with a short, typically superficial, account of scientific method, only two discussed the relationship of science to religion. The first, a biology text, devoted three pages to reviewing Galileo’s troubles with the church, the bogus claims of “creation science,” and Darwin’s statement, in the last paragraph of *On the Origin of Species*, that “the powers of life” have been “breathed by the Creator” into nature — from which the text concludes that evolution need not be incompatible with religion.¹⁶ (Of course, Darwin ended up agnostic on this question. Moreover, why should we take Darwin as having settled the matter?)

The second, a physics text, asserted that religion “has to do not with nature, but with meaning and its implications for personal and communal life.” Hence “science and religion are as different as apples and oranges,” and, “unless one has a shallow understanding of either or both, there is no contradiction in being religious and being scientific in one’s thinking.”¹⁷ Given that the discussion is only two paragraphs long, this text does little to prevent shallow thinking about this matter.

Neither the physics texts nor the earth science texts addressed the possible religious significance of the Big Bang or of cosmic evolution. While each of the five biology texts dealt with evolution at length, only one discussed religious interpretations of nature, describing natural theology prior to Darwin and acknowledging that Darwin “subverted” the traditional religious conception of the world.¹⁸ While each of the biology and earth science texts did discuss ecosystems and the ecological crisis, none mentioned religious interpretations of the problem or of nature. Religion is mentioned four times in passing in the National Science Education Standards. But there is no discussion of religious interpretations of nature or of the re-

lationship between science and religion. The standards are clear that “explanations on [sic] how the natural world changes based on myths, personal beliefs, religious values, mystical inspiration, superstition, or authority may be personally useful and socially relevant, but they are not scientific.”¹⁹ Science and religion are, evidently, distinct domains.

Consequently, it is not surprising that the standards include no discussion of the relationship of religion to the Big Bang, to cosmic evolution, to the origins of life, to biological evolution, to genetics, to technology, or to health. (The National Health Education Standards are also silent on religion.)

What can we conclude? In ignoring the relationship between science and religion, the national standards and the textbooks ignore one of the most momentous questions of modern intellectual and cultural history. While the national standards place some emphasis on teaching the history of science and on relating science to “larger ideas, other domains, and the world beyond,”²⁰ they appear to assume either that science always trumps religion or that science and religion are incommensurable endeavors. In either case, religion has no place in the discussion. God clearly doesn’t measure up to scientific standards. The implicit message is that science is fully adequate for giving a complete account of nature. They allow no philosophical room for religious arguments or evidence, and religious interpretations of nature are, in effect, condemned to irrelevance.²¹

Conclusions

Leaders of national education organizations agree that the study of religion has a legitimate place in the public school curriculum.²² Almost always, however, the study of religion is relegated to history texts and courses that trace the early development of religions — and then forget about them. My questions are, What should students learn about contemporary religion, about religious interpretations of nature, and about the relationship between religion and science?

A good liberal education should introduce students to the major ways humankind has developed for making sense of the world and their lives. In so doing, it should give them the perspective to think

critically about these matters. Indeed, it should provide students with the perspective to think critically about the conceptual nets that we give them to use to make sense of the world. When we uncritically initiate students into one way of thinking and systematically ignore the alternatives, we indoctrinate them and marginalize them in the process. That is to say, when we disagree about matters of great importance, we must teach the conflicts — fairly.

Because we disagree deeply about how to make sense of nature, it is profoundly illiberal to teach students to use only conceptual nets of science. Indeed, if students are to think critically about science rather than simply to accept it on authority, as a matter of faith, they must understand the religious alternatives. They must be initiated into a critical conversation about the nature and possible limits of science and about its relationship to various religious traditions.

Of course, this problem cuts across the curriculum: we teach students to think about every subject in the curriculum — history, economics, literature, psychology, sexuality, and morality — in secular rather than in religious ways. Public education nurtures a secular mentality.

Science courses should be science courses, not theology courses, but this doesn’t mean that they should ignore religion completely. All science textbooks and courses should include some discussion of the relationship between science and religion in an opening chapter or in opening lectures, as part of a review of the history and philosophy of science and scientific method. Moreover, they should provide some context for understanding what is at issue religiously in dealing with evolution, the Big Bang, ecology, and other controversial issues.

Because such chapters in textbooks will inevitably be superficial, an adequate liberal education requires that high school students take a course in religious studies in which religious interpretations of nature (among other topics) are treated in considerable depth, in the context of studying various religious traditions, by teachers certified in religious studies. Science teachers aren’t prepared to teach about religion, although it would be helpful if prospective science teachers took an undergraduate course in science and religion. Science courses may not be in a position

to be robustly fair to religion, but the curriculum as a whole can be.

What can teachers and texts say about the truth of science? It is sometimes argued by religious conservatives that evolution — or, presumably, any religiously controversial scientific theory — should be taught as “mere theory” rather than as a fact. There is a point to this, though it is often misunderstood. In science, a theory is not a hypothesis or mere speculation, but a comprehensive conceptual scheme that relates a broad range of phenomena in a way that explains them. Theories can be confirmed or falsified. No doubt some aspects of evolutionary theory remain controversial — gradualism versus punctuated equilibrium, for example — but most scientists take evolution and neo-Darwinian accounts of it to be confirmed.

It is one thing to teach students that neo-Darwinism is good science; it is another thing to teach them that they are justified in believing it to be true, all things considered. Whether neo-Darwinism is an adequate account of evolution is, in part, a philosophical question that hinges on how we assess the relationship between science and religion. One purpose of a liberal education is to put students in a position to make “all things considered” judgments, rather than to accept uncritically the conventional wisdom of any discipline, science included. I should note that, while a good liberal education will introduce students to contending ways of thinking about the world, it will not do so in the abstract. Creationism, theories of intelligent design, theological accounts of evolution, and neo-Darwinism aren't simply dishes on a cafeteria line that students are free to choose depending on their tastes. Educated judgments require intellectual and cultural context. Students should learn how widely held the different views are, and within which scientific and religious traditions. Which are consensus views, which are controversial views, and for whom? And what can each view say in defense of itself or in criticism of its competitors?

Finally, I note that while the science standards say virtually nothing about religion, my proposal may not fall too far from their spirit. According to the standards, students should learn how scientific knowledge “connects to larger ideas, other domains, and the world beyond.” This being the case, teachers need to be able to make “conceptual connections” to

“other school subjects.”

I want to be clear about what I am not arguing: I am *not* arguing that any particular scientific theories are false, that scientific methods are inadequate for understanding reality, or that religious ways of making sense of nature are more reasonable. I am arguing that the relationship between science and religion and the adequacy of scientific method for getting at the fundamental structure of nature are deeply controversial matters. Consequently, if students are to be liberally educated about nature, they must hear a variety of voices, not just those of scientists. While religion is best studied in religion courses, science texts and courses must say something about various ways of understanding the relationship between science and religion if they are to fulfill the purposes of a liberal education and not simply indoctrinate students.

The problem is far broader than the conflict between evolution and religious fundamentalism. Our ongoing cultural conversation about the relationship between science and religion is much more interesting and important than most educators appreciate, and it strikes me as scandalous that we don't let students in on this conversation. After all, a good deal hangs on whether there is more to nature and the universe than science is able to catch in



“Bad day at school?”

its conceptual nets.²³

1. Carl Sagan, *Broca's Brain: Reflections on the Romance of Science* (New York: Random House, 1974), pp. 290-92.

2. This article draws on material developed at considerably greater length in chapters 1, 2, and 7 of Warren A. Nord and Charles C. Haynes, *Taking Religion Seriously Across the Curriculum* (Alexandria, Va.: Association for Supervision and Curriculum Development, 1998) and in chapters 1 and 4-7 of Warren A. Nord, *Religion and American Education: Rethinking a National Dilemma* (Chapel Hill: University of North Carolina Press, 1995).

3. See Ian Barbour, *Religion and Science: Historical and Contemporary Issues* (San Francisco: Harper San Francisco, 1997), chap. 4.

4. National Academy of Sciences, *Science and Creationism* (Washington, D.C.: National Academy Press, 1984), pp. 4-6.

5. National Academy of Sciences, *Teaching About Evolution and the Nature of Science* (Washington, D.C.: National Academy Press, 1998), p. 58.

6. “Statement on Teaching Evolution,” available from the National Association of Biology Teachers website, www.nabt.org/oldsite/evolution.html.

7. Arthur Peacocke, *Intimations of Reality: Critical Realism in Science and Religion* (Notre Dame, Ind.: University of Notre Dame Press, 1984), p. 1.

8. Stephen Jay Gould, *Full House* (New York: Random House, 1997), chap. 14.

9. “Statement on Teaching Evolution.”

10. Charles Darwin, *The Autobiography of Charles Darwin and Selected Letters*, ed. Francis Darwin (New York: Dover, 1958), p. 63.

11. Pope John Paul II, “Message to the Pontifical Academy of Sciences on Evolution,” *Origins*, 14 November 1996.

12. See, for example, Michael J. Behe, *Darwin's Black Box* (New York: Simon & Schuster, 1996).

13. Barbour, pp. 204-6.

14. John Polkinghorne, “Religion in an Age of Science,” 1993 McNair Lecture, University of North Carolina, Chapel Hill.

15. See Nord and Haynes, chap. 7.

16. *Biological Sciences* (Lexington, Mass.: D.C. Heath, 1996), p. 16.

17. *Conceptual Physics* (San Francisco: HarperCollins, 1992), p. 12.

18. *Biology* (Redwood City, Calif.: Addison-Wesley, 1993), p. 422.

19. National Research Council, *National Science Education Standards* (Washington, D.C.: National Academy of Sciences, 1996), p. 201.

20. *Ibid.*, p. 36.

21. See Phillip E. Johnson, *Reason in the Balance: The Case Against Naturalism in Science, Law and Education* (Downers Grove, Ill.: Intervarsity Press, 1995).

22. See Nord and Haynes, pp. 9-10, 36-37.

23. Readers may well wonder about the constitutionality of my proposals. It is uncontroversial that it is permissible to teach about religious views of nature in the public schools, but it can also be argued that such teaching is *required* if public education is to be truly neutral, in accordance with the courts' interpretation of the First Amendment. See Nord, pp. 241-49, 292-96; and Nord and Haynes, pp. 23-25, 153-55. ■