

14.

WHERE CAN GOD ACT?

I found extraordinary difficulty, when I thought about events in scientific terms, in imagining any kind of loophole through which God could influence them.

—William Pollard¹

The demise of enlightenment deism

We have seen how Newtonian mechanics implies that the laws of physics predetermine everything that happens in the material universe. It follows that if a creator god exists, he has nothing to do once he creates the universe and its laws and sets the initial conditions from which those laws take off.

This characterizes an impersonal *deist* god, a creator who does not act in the universe, as opposed to the personal *theist* God who continues to interact with the universe and its inhabitants after creation. Deism became the religion of many important intellectual figures in the Age of Enlightenment, when reason mounted its first serious challenge to scriptural and traditional authority in the history of Christendom. The primary founders of the American republic were deists including, it seems, the first four presidents.

Both the Enlightenment and deism faded early in the nineteenth century, as Europe endured the bloody French revolution followed by the Napoleonic wars, while the United

States experienced the second phase of the so-called “Great Awakening” to a spiritual faith that placed feeling and emotion ahead of reason.

In the early twentieth century the rug was pulled out from under enlightenment deism with the development of quantum mechanics. In Newtonian mechanics, the position and momentum of a body are needed to predict its motion. The quantum Heisenberg uncertainty principle shows that cannot be measured simultaneously with unlimited precision. It follows that the motion of a body cannot be predicted with unlimited precision.

Note that the uncertainly principle did not eliminate the high predictability of physical events on the macro scale. Recall the example of a one-gram body initially located to within a cubic centimeter. The uncertainty in its speed is only 5×10^{-30} meters per second and so its motion using Newtonian mechanics can be predicted with a probability that, while not 100 percent, is surely sufficient for any practical purpose.

We have seen that the methods of quantum mechanics, as used in practice, only predict the statistical distribution of events and not the occurrence of any individual event. In most interpretations of quantum mechanics this is taken to mean that the events themselves are not predetermined intrinsically but happen by chance within limitations placed by global laws of physics such as energy and electric charge conservation. Note that the statistical distributions, as described by the quantum wave function are in fact predetermined by initial conditions and an equation of motion called the *time-dependent Schrödinger equation*. Still we can safely disregard the clockwork universe and with it enlightenment deism.

Surprisingly, an unacknowledged deism seems to have remained in people's minds to the present day. We saw some evidence for this in chapter 1 where I reported on a survey that indicates some 40 percent of Americans believe in a god who does not act either in the universe or in their own lives. Although mostly professed Christians, they apparently do not hold the image of the traditional Christian God who steps in to alter the course of history. These ordinary laypeople have apparently intuited a fact that Christian theologians have finally begun to grasp: the Christian God is very difficult to reconcile with science, logic, or common sense. In place theism a new kind of deism is being developed by some theologians and believing scientists, although they are not yet ready to admit that their new god has little in common with the traditional God of Christianity, Judaism, and Islam.

No God in the gaps

In this book I have not had much to say about the war between science and religion over the issue of evolution. That subject has been covered extensively in a host of other books. The opposition to evolution though often cast as a disagreement with mainstream science over alternative "theories" is motivated by the conviction, which I share, that evolution and biblical faith are irreconcilable. The difference I have with creationists is they think that the Bible is correct and science is wrong, while I think that science is correct and the Bible is wrong. As we will see, however, evolution does not conflict with the new deism.

The conflict between science and religion goes much deeper than creationism versus evolution. Evolution is just one component in the scientific world-view in which reality is composed solely of matter and nothing more—no spirits, souls, or gods. As I have shown in some detail, materialism is consistent with all scientific knowledge as well as

commonplace experience. We have well-established theories that can be used to accurately describe most scientific observations as far out as we can see in space and as deep down as we can look into matter. We have no empirical fact that requires us to introduce anything beyond matter. While we must always remain open to the possibility that some new evidence will be found in the future that points to a spirit world, at this writing no such evidence exists.

Of course science does not know everything. We still have, and no doubt will always have, gaps in our scientific knowledge. Technically this still leaves room for the immaterial or spiritual to appear—the so-called “God of the gaps.” However, the mere existence of a gap in knowledge cannot be used as an argument for the existence of some god or spirit, as long as we can give plausible tentative explanations that do not require the introduction of any immaterial or supernatural elements.

For example, while we do not know exactly the mechanism by which our universe appeared 13.7 billion years ago, we can present any number of plausible scenarios based on well-established physics and cosmology. I presented two such scenarios in my book *The Comprehensible Cosmos*.² They will be discussed in the last chapter.

Similarly, we cannot describe exactly how life originated, but many proposed scenarios consistent with well-established chemistry and biology can be found in reputable scientific journals.³ Thus no rational basis exists for claiming that a supernatural origin for life or the universe must have occurred. The same is true across the board: from cosmology to neuroscience no case can be made that we need something more than matter to understand the universe.

The premise keepers

Many contemporary Christian theologians and theistic scientists accept the results of science and do not dispute the power of its meticulous procedures. Nevertheless they still assume that a world beyond matter exists. They argue that religious belief has been so persistent throughout history that there has to be something to it. They then proceed to make an honest attempt to reconcile science with the images of God drawn from traditional beliefs.

In earlier writings, which mainly focused on evolution theology, I referred to this group as the “premise keepers.”⁴ They include, among others, the particle physicist and Anglican priest John Polkinghorne, the biochemist and Anglican priest Arthur Peacocke, the evolutionary biologist and devout Catholic Kenneth Miller, the physicist and theologian Ian Barbour, the cosmologist and Quaker George Ellis, the physicist and theologian Willem Drees, and theologians John Haught and Nancey Murphy. Here I will review their attempts to find a way for God to act in the world and ask whether they are viable in the light of modern science.

The problem of locating God’s action was the subject of a multi-year collaborative project between the Vatican Observatory and the Center for Theology and the Natural Sciences headquartered in Berkeley, which alone testifies to the fact that this is not a settled matter even in the Catholic church. Five volumes of proceedings edited by Center director Robert John Russell and various other scholars were produced.⁵ In 2006 a whole issue of *Zygon, the Journal of Religion and Science* was devoted to the question.⁶ Comprehensive analyses of divine action can be found in the book by Nicholas Saunders⁷ (see also Saunders article in *Zygon*) and the review articles by Wesley J. Wildman.⁸ A

number of other books on the subject of varying scholarly quality have also been published.^{9,10,11,12,13}

The Vatican series

In this section I will relate some of the key arguments made in first three volumes of the Vatican series (the fourth was not available at this writing). Here I will be relying mainly on material from the overview on the project website. Looking at the originals I am confident that these summaries are accurate and of excellent quality. The outer quotations (“summary quotation”) are taken from those summaries; the inner quotations (‘author quotation’) are from the original authors. My own comments are occasionally added.

It is not possible for me to cover every article in the series and I have selected those that I feel provide a good representation of the range of views presented. Also, keep in mind that, independent of their own personal beliefs, all the authors are writing from a theological perspective in which God is assumed to exist and the question is what role he plays in the universe.

Vol. 1. Quantum Cosmology and the Laws of Nature (1993)

William Alston, “Divine Action, Human Freedom, and the Laws of Nature.”

Alston argues that because of quantum indeterminism, God can act without violating physical law. However, he points out that even when you have only deterministic laws they only allow absolute predictions for *closed* systems, that is, systems that have no outside influences. We have no way of knowing if the universe is closed and we know all

the operative forces at work. “Hence, in this more general sense, God’s acts do not violate natural law regardless of whether these laws are probabilistic or deterministic.”

Comment: Even if we can’t make predictions in an open deterministic universe (and in many cases we can), it is still deterministic so God can’t act unless he breaks his own laws. Besides, the universe is a closed system unless there is some outside force. What force can that be except some kind of god?

Paul C. W. Davies, “The Intelligibility of Nature.”

“What is most significant about nature is that the universe is ‘ . . . poised, interestingly, between the twin extremes of boring over-regimented uniformity and random chaos.’ Accordingly it achieves an evolution of novel structures through self-organizing complexity. ‘The laws . . . encourage physical systems to self-organize to the point where mind emerges from matter, and they are of a form which is apprehendable by the very minds which these laws have enabled nature to produce.’” However, Davies does not claim that this leads to an argument for God. He prefers “an evolutionary interpretation of mind as emergent within the material process of self-organization. The emergence of mind with its ability to pursue science is not just a ‘biological accident.’ Instead it is inevitable because of the laws of physics and the initial conditions. Hence life should emerge elsewhere in the universe—a claim which Davies sees as testable.”

Comment: This supplements our discussion of emergence in chapter 10. We will later discuss the role of emergence in theology.

Thomas F. Tracy, "Creation, Providence, and Quantum Chance."

“Theologians from deists to liberals such as [Friedrich] Schleiermacher, [Rudolf] Bultmann, and [Gordon] Kaufman, have worked with a closed causal picture of the world that they feel is authorized by science. They have taken this to be incompatible with divine action in the world, leaving either a God who only sets the world’s initial conditions or whose actions violate the laws of nature. But contemporary natural science does not necessarily lead to a deterministic metaphysics. Tracy cites two possible responses. First, a theologically sufficient account of God’s particular actions in history might actually be developed that still limits God to being the creator of history as a whole. Second, God can be said to act in particular cases without intervention in history if one can defend an indeterministic interpretation of natural causes. It is here that quantum physics might be relevant.”

Comment: This sounds like the deist god, although Tracy allows action in “particular cases” that do not change history. Those actions can’t be very important, then.

Vol. 2. Chaos and Complexity (1996)

James P. Crutchfield, J. Dooyne Farmer, Norman H. Packard, and Robert S. Shaw,
"Chaos."

“The amplification of small fluctuations may be one way in which nature gains ‘access to novelty’ and may be related to our experience of consciousness and free will.”

Willem B. Drees, "Gaps for God?"

“Theories of chaotic and complex systems have made it clearer than ever before that a

naturalistic explanation of the world is possible, even in light of the lack of predictability of these systems. These theories have effectively closed certain gaps in our understanding of nature. [Drees is] critical of John Polkinghorne's suggestion that the unpredictability of natural processes provides a potential locus for divine action. Polkinghorne suggests that God brings about an input of information into the world without an input of energy. Drees claims that this is inconsistent with quantum physics and thermodynamics. In addition, Polkinghorne seems to interpret the unpredictability of chaotic systems as a sign of intrinsic openness, but this ignores the real meaning of deterministic chaos. Moreover, discarding the theory of deterministic chaos would be inconsistent with the very critical realism that Polkinghorne promotes."

Comment: Drees is the most atheistic Christian theologian I know of.

George F. Ellis, "Ordinary and Extraordinary Divine Action: The Nexus of Interaction."

"Some account of *special* divine action is necessary if the Christian tradition is to make sense. However, there are two important constraints to be reckoned with. One is that an ideal account of divine action must not conflict with a scientific understanding of nature; the other is that some explanation must be given of why a God capable of special action would not exercise that ability regularly to oppose evil and ameliorate suffering."

"[Ellis's] analysis of top-down causation convinces him that this concept alone does not provide for an adequate account of divine action . . . A study of the possibilities for divine action via top-down causation leads inevitably to a consideration of divine action

at the quantum level.”

“Ellis takes God’s action to be largely *through* the ordinary created processes. God initiates the laws of physics, establishes the initial conditions for the universe, and sustains the universe and its processes, which in turn result in the emergence of higher levels of order, including, finally, free human beings. Special divine action focuses on providing to human beings intimations of God’s will for their social lives. Thus, the problem of the mode of divine action is largely a question of how God might communicate directly with those who are open to revelation. Ellis speculates that quantum events in the brain (directed by God) might be amplified to produce revelatory thoughts, images, and emotions. If it is supposed that God has adequate reason to restrict divine action to a combination of ordinary action (in and through natural processes) and revelation (such as the Resurrection of Christ) then the problem of evil does not take on the same dimensions as it does when it is assumed that God might freely intervene in any sort of process at any time.”

Comment: Good try.

Bernd-Olaf Koppers, “Understanding Complexity.”

“Epistemic reductionism leads to ontological reductionism in which ‘life is nothing but a complex interplay of a large number of atoms and molecules.’ Even consciousness must ultimately be reducible to physical laws. To counter this program, some biologists and philosophers of science appeal to ‘emergence’ and ‘downward causation.’ claiming that genuinely novel properties and processes arise in highly complex phenomena. According

to this view, physics is a necessary part of the explanation but it cannot provide a sufficient explanation on its own. Küppers summarizes the claims of emergence and downward causation, respectively, as follows: ‘(1) The whole is more than the sum of its parts. (2) The whole determines the behavior of its parts.’”

Küppers concludes that ‘both (emergence and downward causation) must be thought of as characteristics of self-organizing matter that appear at all levels when matter unfolds its complexity by organizing itself.’

John Polkinghorne. “The Metaphysics of Divine Action.”

“Polkinghorne prefers an approach based upon interpreting the unpredictabilities of chaotic dynamics (in accord with the strategy of critical realism) as indicating an ontological openness to the future whereby ‘active information’ becomes a model for human and divine agency. He interprets sensitivity to small triggers as indicators of the vulnerability of chaotic systems to environmental factors, with the consequence that such systems have to be discussed holistically. It is *not* supposed, however, that such triggers are the local mechanism by which agency is exercised.”

Comment: This seems to be a change from his earlier views.

Nancey Murphy, “Divine Action in the Natural Order: Buridan’s Ass and Schrödinger’s Cat.”

“Murphy argues that the problem of divine action will be solved by nothing less than a revised metaphysical theory of the nature of matter and of natural causes. Her proposal is that we view the causal powers of created entities as inherently incomplete. No event

occurs without divine participation but, apart from creation *ex nihilo*, God never acts except by means of cooperation with created agents.

She claims that [criteria, derived from both theology and science, which any satisfactory theory of divine action must meet] must allow for objectively special divine acts, yet not undercut our scientific picture of the law-like regularity of many natural processes

Murphy's proposal is that any adequate account of divine action must include a 'bottom-up' approach: if God is to be active in all events, then God must be involved in the most basic of natural events. Current science suggests that this most basic level is quantum phenomena. It is a bonus for theology that we find a measure of indeterminacy at this level, since it allows for an account of divine action wherein God has no need to overrule natural tendencies or processes. This cooperation rather than coercion is in keeping with God's pattern of respecting the integrity of other higher-level creatures, especially human creatures.

One of these consequences is that the 'laws of nature' must be descriptive, rather than prescriptive; they represent our human perceptions of the regularity of God's action."

Comment: Murphy seems to agree with me about the laws of nature being human inventions. So, there are at least two of us.

Arthur Peacocke, “Chance and Law in Irreversible Thermodynamics, Theoretical Biology, and Theology.”

“Peacocke sees chance as the means by which all possibilities for the organization of matter are explored in nature.”

Arthur Peacocke, “God’s Interaction with the World: The Implications of Deterministic “Chaos” and of Interconnected and Interdependent Complexity.”

“Peacocke concludes that, whatever is decided about those effects, the unpredictabilities for us of non-linear chaotic and dissipative systems do not, as such, help us in the problem of articulating more coherently and intelligibly how *God* interacts with the world, illuminating as they are concerning the flexibilities built into natural processes. The discussion is based in part on the assumption that God logically cannot know the future, since it does not exist *for* God to know.”

Comment: This seems to conflict with the Augustinian notion of God being timeless. Furthermore, it assumes a fundamental arrow of time, which we have seen cannot be found in physics except as a definition.

Vol. 3. Evolution and Molecular Biology (1998)

Ian G. Barbour, “Five Models of God and Evolution.”

Barbour “outlines four philosophical issues which characterize the interpretation of evolution. *Self organization* is the expression of built-in potentialities and constraints in complex hierarchically-organized systems. This may help to account for the directionality of evolutionary history without denying the role of law and chance. *Indeterminacy* is a

pervasive characteristic of the biological world. Unpredictability sometimes only reflects human ignorance, but in the interpretation of quantum theory, indeterminacy is a feature of the microscopic world and its effects can be amplified by non-linear biological systems. He also argues for *top-down causality* in which higher-level events impose boundary conditions on lower levels without violating lower-level laws and he places top-down causality within the broader framework of holism. He distinguishes between methodological, epistemological, and ontological reduction. *Communication of information* is another important concept in many fields of science, from the functioning of DNA to metabolic and immune systems and human language.

According to Barbour, each of these has been used as a non-interventionist model of God's relation to the world in recent writings. If God is *the designer of a self-organizing process* as Paul Davies suggests, it would imply that God respects the world's integrity and human freedom. Theodicy is a more tractable problem if suffering and death are inescapable features of an evolutionary process for which God is not directly responsible. But do we end up with the absentee God of deism? The *neo-Thomist* view of God as *primary cause* working through secondary causes as defended by Bill Stoeger tries to escape this conclusion, but Barbour thinks it undermines human freedom. Alternatively, God as providential *determiner of indeterminacies* could actualize one of the potentialities present in a quantum probability distribution. Selection of one of the co-existing potentialities would communicate information without energy input, since the energy of the alternative outcomes is identical. Does God then control all quantum indeterminacies—or only some of them?"

Comment: An attempt to avoid deism.

Paul Davies, "Teleology Without Teleology: Purpose through Emergent Complexity."

“Paul Davies offers us a modified version of the uniformitarian view of divine action. In selecting the laws of nature, God chooses specific laws which allow not only for chance events but also for the genuine emergence of complexity. He claims that the full gamut of natural complexity cannot be accounted for by neo-Darwinism, relativity, and quantum mechanics; one must also consider nature’s inherent powers of self-organization based on, though not reducible to, these laws. Still the emergence of complexity does not require special interventionist divine action.”

“God selects the laws of nature; being inherently statistical, they allow for chance events at the quantum or chaos levels as well as for human agency. God need not violate these laws in order to act, and there is room for human freedom and even for inanimate systems to explore novel pathways. He then argues that quasi-universal organizing principles will be found to describe self-organizing, complex systems. They will complement the laws of physics, but they would not be reducible to or derivable from physics, nor would they refer to a mystical or vitalistic addition to them.”

“Chance in nature is God’s bestowal of openness, freedom, and the natural capacity for creativity. The emergence of what he calls the ‘order of complexity’ is a genuine surprise, arising out of the ‘order of simplicity’ described by the laws of physics . . . The acid test, according to Davies, is whether we are alone in the universe. If the general trend of matter toward mind and culture is written into the laws of nature, though its form depends on the details of evolution, we would expect that life abounds in the universe.

This accounts for the importance of the SETI [Search for Extraterrestrial Intelligence] project.”

God acting against God

The premise keepers seek a God who does not violate laws of nature. These acts might be in response to earnest prayers, or the need to fix up some sequence of events that has gone off course just because of the large amount of random, unpremeditated chance that evidently exists in our universe. As Polkinghorne has put it, if God worked against the laws of nature it would be God acting against God, the presumed author of those laws.¹⁴ So it is not simply a matter of saying God is God—he can do anything he wants to do. Sure God could exempt himself from any law he writes. But then, if he does this on a regular basis we humans should be expected to empirically detect such actions in ways that I discussed in *God: The Failed Hypothesis*. Whatever actions the premise keepers propose for God to take in the current world, they seriously attempt to make them consistent with the laws of nature—at least as we perceive them on the human scale. This is not a restriction on God; it is a restriction on the possible theories of God that certain theologians wish to consider. In this scheme, what may appear as a miracle is just an unusual event—not a violation of natural law.

Another restriction on theologians is that their theories of God must allow for human free will, which is fundamental to Christian teaching. This means that God’s actions might be thwarted by human actions. Somehow theologians have to arrange it so that divine action is beyond the reach of human capability to undo.

Acting in physics

As discussed earlier, the possibility remains that the universe is deterministic, in which case we would have the enlightenment deist god back again. For the rest of this chapter let us ignore that possibility and stick with the conventional interpretation of quantum mechanics as a statistical theory that only determines the behavior of ensembles of systems.

Does the uncertainty principle of statistical quantum mechanics open up a place for God to act, poking his finger in so that a particle goes where he wants rather than, as implied by quantum mechanics, some non-predetermined place? Many premise keepers have suggested so, with William Pollard, a physicist turned Episcopalian priest, setting the agenda in 1958.¹⁵ For a complete history including a good discussion of Pollard's views, see the book by Saunders.¹⁶ I will focus on more current work.

Recall the example given in chapter 8 of a free electron (that is, an electron not bound in an atom) initially confined to a region the size of an atom. We saw that in six seconds it could be anywhere within a volume the size of Earth. In this case, God could direct the motion of that electron to where he wants it within the limits of uncertainty principle. By limiting himself to placing the electron at a precise location within a volume the size of Earth in six seconds, humans would not be able to detect that fact.

But note that God is in fact still violating a law of physics when he steps in. That violation is simply not detectable to humans. So this proposal still breaks Polkinghorne's dictum. God is acting against himself. Also note that by limiting himself to placing the electron within a finite region of space he is surrendering some of his omnipotence.

Every gram of matter contains a trillion-trillion electrons, protons, and neutrons. The visible universe contains 10^{79} . The universe beyond our horizon contains at least 10^{130} of these particles. Multiply these numbers by a billion to get the number of photons and neutrinos. This means that the deity has to somehow maintain control over countless events taking place at the submicroscopic level over extended periods of time.

The prospect of God micromanaging all these particles throughout the universe (and perhaps many other universes) does not appeal to many of today's theologians. They are looking for ways for God to act on the everyday scale of human experience where that action is meaningful to humanity. If God is to act in the universe, those actions must be amplified by some mechanism and, what is more, they must involve large-scale phenomena that are otherwise not predetermined.

Butterflies and Chaos

Polkinghorne and others have proposed that the amplification mechanism might be found in the so-called butterfly effect of chaos theory, which we discussed in chapter 10. In this scheme, working within the uncertainty principle, God changes the initial conditions of a chaotic system to affect the outcome. Recall that chaos theory is fundamentally deterministic and that the unpredictability associated with outcomes in chaotic systems can be traced to their extreme sensitivity to initial conditions that are often not known with sufficient accuracy. Not having human limitations, God can presumably set the initial conditions with unlimited precision and, knowing how to do Newtonian mechanics better than we do and presumably having the best computer in heaven at his disposal, obtain his desired outcome. However, suppose those initial conditions have quantum

uncertainties. Then, as we noted above, God acting “within the uncertainty principle” would still violate natural law and simply keep that fact hidden from us.

Christian schoolmaster Timothy Sansbury has pointed to three other problems associated with this scenario for God’s action.¹⁷ First, a significant time delay is involved in the kinds of chaotic amplification systems we might consider. For example, it might take several days for the butterfly effect to change the weather. Chaos amplification certainly would not move fast enough to change the course of a tornado heading straight for your house, or end a storm endangering a ship at sea. Of course, God, knowing everything, might anticipate those prayers. But then he would have foreknowledge of supposedly free will events, in which case they are not free.

Second, it is not clear that dramatic changes, such as bringing rain in response to farmers’ prayers, can be effected in this manner.

Third, during the time that a chaotic system is working its way from initial conditions to final outcome, something might happen to change that course. This may not be a butterfly flapping its wings, but since we are assuming God gave humans free will, some human might take an action that God did not anticipate when he made his adjustment to the initials conditions. For example, that human might decide at the last moment to get into his carbon monoxide-emitting SUV and drive to Las Vegas, changing the chemical composition of the atmosphere just enough to thwart God’s plan.

God could of course decide to limit human free will. However this would violate one of the premises to be kept, namely a high level of human free will. Furthermore, preventing human interference with his desires still would not guarantee sufficient time for his quantum diddling to produce his desired macroscopic outcome. And, as already

noted, most human-scale systems are not chaotic and so chaos amplification would not apply to them.

Sansbury adds:

Even if quantum mechanics does offer the space for ongoing divine action without any breakdown of natural law, it does not provide an answer to the underlying problem of how divine action can be responsive to indeterminate events. If the response must come after the event, quantum mechanics implies that divine responses will usually be delayed even if delay is inappropriate to the situation and sometimes will fail altogether. If the action is originated before the event, the implication is either that God knows the final states of future indeterminate events, which is presumed to be contrary to true indeterminacy, or that God acts on presumptions about indeterminate events and therefore can be wrong or thwarted by other indeterminate events. In either case, the problem of avoiding a God who tinkers or who controls from the past is not solved.¹⁸

In short, while quantum mechanics with chaotic amplification may provide a place for god to act to change a natural event, it will not always prove possible, rendering God as somewhat less than omnipotent. More important, these still involve violations of God's laws.

Notice that if God acted at the quantum level, even though he would not be able to affect the outcome of every event, he could for some. For example, he might have easily prevented the evolution of smallpox from cowpox and the AIDS virus from simian

immunodeficiency disease. So the theodicy problem, the problem of evil, remains even in the light of God's less than full omnipotence.¹⁹

So it appears from this physicist's point of view that direct involvement in quantum and chaotic processes does not provide a viable, effective process by which God can act without violating his own laws of nature. At best he can only hide those violations. Furthermore, they will not work in all situations. This does not rule out, however, the possibility of a deist god who created the universe and endowed upon it the ability act creatively to carry out his plans.

Notes

¹ William G. Pollard. *Chance and Providence: God's Actions in a World Governed by Scientific Law* (London: Faber and Faber, 1958), p. 12.

² Victor J. Stenger. *The Comprehensible Cosmos: Where Do the Laws of Physics Come From?* (Amherst, NY: Prometheus Books, 2007), pp. 312-19; see also "A Scenario for a Natural Origin of Our Universe, *Philo* 9, no. 2 (2006): 93-102.

³ See, for example, D. J. Donaldson, H. Tervahattu, A.F. Tuck, and V. Vaida, "Organic Aerosols And The Origin Of Life: An Hypothesis," *Origins of Life and Evolution of the Biosphere* 34 (2004): 57-67.

⁴ Victor J. Stenger, "The Premise Keepers," *Free Inquiry* 23, no. 3 (Summer 2003); *Has Science Found God?* (Amherst, NY: Prometheus Books, 2003), chapter 11.

⁵ Robert John Russell, Nancey Murphy, Arthur Peacocke, and C.J. Isham eds. *Quantum Cosmology and the Laws of Nature: Scientific Perspectives on Divine Action* (Vatican City: Vatican Observatory Publications, 1993); Robert John Russell,

Nancey Murphy, and Arthur Peacocke, eds. *Chaos and Complexity: Scientific Perspectives on Divine Action* (Vatican City: Vatican Observatory Publications, 1996); Robert John Russell, William R. Stoeger, eds. *Evolutionary and Molecular Biology: Scientific Perspectives on Divine Action* (Vatican City: Vatican Observatory Publications, 1998); Robert John Russell, Nancey Murphy, Theo C. Meyering, and Michael A. Arbib, eds. *Neuroscience and the Person: Scientific Perspectives on Divine Action* (Vatican City: Vatican Observatory Publications, 1999); Robert John Russell, Philip Clayton, Kirk Wegter-McNelly, and John Polkinghorne eds. *Quantum Mechanics: Scientific Perspectives on Divine Action* (Vatican City: Vatican Observatory Publications, 2001). For information on the series and a good summary of each talk in the first three volumes, go to <http://counterbalance.net/ctns-vo/index-frame.html> (accessed May 1, 2008).

⁶ Zygon 41 Issue 3 (September 2006): 501-778.

⁷ Nicholas Saunders. *Divine Action and Modern Science* (Cambridge: Cambridge, 2002).

⁸ Wesley J. Wildman, "The Divine Action Project, 1988-2003," *Theology and Science* 2, No. 1 (2004): 31-75; "Further Reflections on the Divine Action Project," *Theology and Science* 3, No. 1 (2005): 71-83.

⁹ Diarmuid O'Murchu. *Quantum Theology: Spiritual Implications of the New Physics* (New York: Crossroad Publishing Company, 1997).

¹⁰ John Polkinghorne. *Belief in God in the Age of Science* (New Haven, CT: Yale University Press, 1998).

¹¹ John Polkinghorne. *Quantum Physics and Theology: An Unexpected Kinship* (New Haven, CT: Yale University Press, 2007).

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- ¹² Philip Clayton. *Mind and Emergence: From Quantum to Consciousness* (Oxford: Oxford University Press, 2004).
- ¹³ Ted Peters and Nathan Hallanger, eds. *God's Action in Nature's World: Essays in Honour of Robert John Russell* (Williston, VT: Ashgate, 2006).
- ¹⁴ John Polkinghorne, "The Metaphysics of Divine Action," in *Chaos and Complexity: Scientific Perspectives on Divine Action*, pp. 147-56.
- ¹⁵ *Chance and Providence*.
- ¹⁶ *Divine Action and Modern Science*.
- ¹⁷ Timothy Sansbury. "The False Promise of Quantum Mechanics," *Zygon* 42, no. 1 (March 2007): 111-12.
- ¹⁸ *Ibid*, p. 112.
- ¹⁹ Thanks to Brent Meeker for pointing this out.