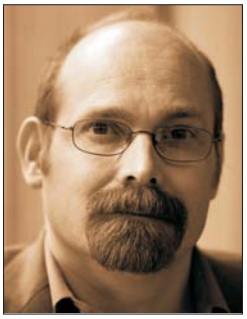

Bruce L. Gordon

In Defense of Uniformitarianism

Bruce L. Gordon

The practice of science rests on the assumption of dependable regularity in the behavior of the physical world. It presumes that the world has an investigable causal structure and that scientific experimentation, observation, and theorizing provide a reliable pathway to its discernment. This much is not in dispute. What is in dispute is what warrants the metaphysical and methodological assumption – essential to the heuristic utility of science – that nature is uniform in such a way that the present can serve as a key to both the past and the future. This article focuses on the metaphysical foundation and justification for uniformitarian assumptions about nature and argues that they are inconsistent with both metaphysical and methodological naturalism.[1]

It is important to be clear about our terminology. In this article, "naturalism" is a philosophical term, and "naturalists" are *not* those who study nature, but rather those who hold certain tenets *about* nature. In particular, *metaphysical naturalists* maintain that there is no such being as God and that there is no realm of being that transcends the physical; all that exists are material substances and processes and things that emerge from them. A *methodological naturalist* may or may not believe that metaphysical naturalism is true, but maintains that, for the purposes of science, one *cannot* appeal to transcendent causes, and therefore scientific research must be pursued *as if* metaphysical naturalism were true, that is, *in the same manner* as it would be *if* metaphysical naturalism were true.

Some think that the principle of the uniformity of nature is equivalent to this restriction—after all, they assert, if God intervened to change the course of nature this deviation would disrupt natural regularity and destroy the possibility of science—but, as we shall see, this is not so, and uniformitarianism must be distinguished clearly from methodological naturalism.

It is, in my opinion, a grave mistake to call the principle of uniformity in the causal structure of nature "methodological naturalism." Such nomenclature lends itself to conceptual confusion in the context of contemporary philosophical discussion and makes it more difficult to explain what is wrong and destructive in current conceptions of science and what efforts can be made to correct this situation. Robert Bishop, in his article "God and Methodological Naturalism in the Scientific Revolution and Beyond,"[2] takes a more sanguine view of "methodological naturalism" as a term and heroically tries to redeem it by associating it with an attitude and approach to science characteristic of the "scientific revolution," and by dissociating it from contemporary conceptions

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that cast it as the methodological handmaiden of metaphysical naturalism. In doing so, it appears that his conception of "methodological naturalism" is not far from what I mean by "uniformitarianism." While our disagreement may therefore be more semantic than substantive, I can only say that I regard the effort to rehabilitate "methodological naturalism" by dissociating it from its dominant meaning in the contemporary context and projecting it anachronistically backward over the history of science, to be a hopeless task. The term is a modern one that played no part in the self-understanding of scientists prior to the late twentieth century, and in the contemporary context, its dominant meaning is precisely the one I have assigned to it. It seems best to me to let it mean just what it has come to mean and to use an entirely different and historically appropriate term—*uniformitarianism*—to represent the needed conception of scientific methodology.

Not that there has not been some controversy surrounding this term too, but most of it has been associated with the literature of young earth creationism, and as Del Ratzsch ably pointed out in *The Battle of Beginnings*, it involves a misunderstanding of what "uniformitarianism" means.[3] Even classical (Lyellian) uniformitarianism recognized the fact that local geological occurrences (volcanoes, earthquakes, floods, mudslides, etc.) have acted catastrophically to geological and paleontological effect. The occurrence of catastrophes in the historical course of nature is *not in the least* contrary to classical uniformitarianism. More salient, however, is the fact that modern uniformitarianism goes beyond the classical conception to recognize the possibility of *global* catastrophes, for example, in the case of the extinction of dinosaurs, and that the rates and intensities of geological and cosmological processes can and have varied. In so doing, however, it has turned into a *methodological* as opposed to a *substantive* assumption and thereby a thesis about the *causal structure* of nature.

The normative stipulation of *modern* uniformitarianism is that geological explanations in particular and scientific explanations in general are circumscribed by the uniformly operating regularities of nature, or extrapolations from them. But this is precisely the idea of uniformity I have in view: the universe has a uniform and investigable causal structure that provides a stable background for scientific experimentation, observation, and theorization. And as we shall see, this conception of uniformity is *perfectly consistent and helpful to the science of intelligent design*, which is a species of uniformitarian analysis.

At the risk of belaboring my point, let me emphasize that there are a number of compelling reasons for choosing to speak of *uniformitarianism* rather than *methodological naturalism* in a Christian context. Since the first of these reasons is related to the way in which providential action in nature is conceived, let me begin by defining two accounts of providential action that have dominated theological discussion. The first, and most popular, is Thomistic secondary causation; the second is occasionalism. Thomistic secondary causation holds that every material substance has been created by God to possess and exercise its own proper causal powers. God contributes to the ordinary course of nature only as a universal or primary cause. He sustains these material substances and their properties as secondary causes. As such, these material substances mediate God's ordinary activity in the world and function as secondarily active and efficient causes in their own right. Occasionalism, on the other hand, holds that God is the sole efficient cause of everything that happens in that part of the universe not influenced by finite sentient agents—such as properly functioning human beings—who can themselves be the fiat initiators of divinely maintained causal chains. In short, in the occasionalist account, impersonal nature possesses no active or passive causal powers of its own, but rather all instances of causation in the inanimate world are occasions of God's direct action—the regularity of nature just *is* the regularity of divine activity.

Now, why should Christians prefer uniformitarianism to methodological naturalism? First of all, as already intimated, assuming uniformity in the causal structure of nature is *not* the same thing as assuming the inviolability of *natural* causes. The latter assumption presumes something about *the nature of nature* that the former does not. If, as most Christians believe, the causal structure of nature has its ontological basis either in God's active maintenance of secondary causes or in his *direct* divine action, then nature's causal structure is properly grounded

in *supernatural* causation, not natural causation. In fact, if *direct* divine action is the fundamental source of natural regularity—as occasionalists maintain—then there is *no such thing* as natural causation where inanimate nature is concerned. We will return to this point later.

Secondly, the term "methodological naturalism" is of recent vintage and projecting it backward over the history of science is anachronistic and creative of misconceptions. While "naturalist" still has "one who studies nature and its development" as a possible meaning, "naturalism" carries no parallel import in present discussions of science or the philosophy of science. Rather, in the understanding that has dominated philosophical discussion for most of the last century, "naturalism" means the negation of supernaturalism. Metaphysically, it is the doctrine that there is no transcendent realm, that God does not exist, and that nature—constituted by the sum total of physical objects and causes—is all that there is. Methodologically, it is the agreement, for the purposes of doing science, to reject supernatural causation and to treat nature *as if* it were a closed system of causes and effects—in short, it is the *methodological* assumption of the causal closure of the physical universe for the purpose of doing science. While some may argue that this is not what the term was intended to mean when it was first introduced and it should not be ceded to those who would use it in this way, I respectfully dissent. Using the term "methodological naturalism" for a conception of the uniformity of nature compatible with Christian thought is clearly inapt in the present environment: the term has been appropriated to mean no more and no less than the *assumption* of the causal closure of the physical universe *for the purpose of doing science*, and this standard appropriation cannot be reversed. That advocates of metaphysical and philosophical naturalism use it as described above could not be otherwise.

But this also is the sense given to it in current discussions by many who are *not* philosophical naturalists. For example, Nancey Murphy goes so far as to call this causal closure principle "methodological atheism," and despite being a theist, endorses it as a valid metascientific constraint.[4] While less than sanguine about its status as a principle governing scientific practice, Alvin Plantinga, Del Ratzsch, Stephen Meyer, William Dembski, and a host of others have also understood methodological naturalism in this way—some of them even in the pages of this journal. Thus there can be little hope in the present cultural milieu of redeeming the term "methodological naturalism" to mean something like "the methodological assumption of the uniformity of nature," and I see no point in making the effort, for its natural association is with philosophical naturalism, not uniformitarianism.

Finally, when methodological naturalism is understood as the assumption, for the purpose of doing science, that physical reality is causally closed, given the fact that *this* is the dominant usage in the current milieu, the assertion that *this* assumption is necessary and integral to the practice of science *deserves to be critiqued* and—I claim—*rejected*. If I were to maintain, as other Christian contributors to this discussion have been inclined to do, that methodological naturalism should be understood as more akin to uniformitarianism, and as Christians we should therefore be quite content with it, then the conception of methodological naturalism that *dominates* current discussion would go unchallenged, and it very much *needs* to be challenged. As Christians, we must reject not only metaphysical naturalism, but also its methodological handmaiden.

Some might still think there is a conceptual confusion here that is removed, as one reviewer remarked, by regarding methodological naturalism (MN) as

> a constraint on the sorts of theories and specifications of data sets that count as scientific [rather than as] the assumption of the causal closure of the physical world … Thus, for example, I might think God conserves the world in being, and also acts specially in it, so that the world is not causally closed; but consistent with that, I might think it makes sense to eschew scientific theories that invoke God or other supernatural entities.[5]

But there is no conceptual confusion here. I have *not* claimed that MN requires a metaphysical commitment to causal closure. What is more, the characterization of MN that I have offered is a direct logical consequence of the constraints that MN (as the reviewer defines it) places on what counts as "scientific." Methodological naturalism is a *qualified* assumption that does not presume that causal closure is a metaphysical fact, but rather prescinds from

transcendent causes *for the purpose of doing science*. In other words, methodological naturalism, *for the purpose of scientific explanations*, precludes appeal to transcendent causes. But what does this entail? It entails that, in constructing *scientific* explanations, one proceed *as if* the universe were a causally closed system. Why? Simply because the only explanations countenanced *within* science (so constrained) are *naturalistic* explanations. This conventional constraint does not preclude the possibility of transcendent explanations that are *not* "scientific," but it does entail that there are no "scientific" explanations that are not naturalistic. Thus, while my definition of methodological naturalism as the methodological assumption of the causal closure of the universe *for the purpose of doing science* may not be the preferred definition of some Christians who advocate MN, nonetheless, it is a *methodologically equivalent restatement* of the constraint their definition embodies. Once this is acknowledged, a conceptual pathway is cleared for an argument that uniformitarianism is conceptually distinct from MN and, from a *Christian* standpoint, superior to it as a criterion for the practice of science.

The uniformitarian principle assumes that the behavior of nature is regular and indicative of an objective causal structure in which presently operative causes may be projected into the past to explain the historical development of the physical world and projected into the future for the purposes of prediction and control. In short, it involves the process of inferring past causes from presently observable effects under the assumption that the fundamental causal regularities of the world have not changed over time. In *contrast*, methodological naturalism is the exclusion of supernatural causes—that is, causes transcending the physical realm—from scientific consideration: in the context of scientific explanations, divine action (or *any* transcendent cause) *cannot* be considered as a possible explanation in any scientific study, period. Thus defined, the principle might better be called *methodological atheism*—which, in fact, is what Nancey Murphy *does* call it—but we will retain the standard terminology.

This much said, I think we can see that the *methodological* assumption of universal causal closure that is integral to methodological naturalism is both *inconsistent* with what Christians believe to be the metaphysical basis for the regularity of the physical world and *unnecessary* to the practice of science. Moreover, as I argue more completely elsewhere,[6] methodological naturalism *lacks* the metaphysical resources to explain the constitution and causal integrity of the physical world. Therefore, not only is it unnecessary for the practice of science, but it also is an *obstacle* to the proper understanding of nature because it *requires an objective misrepresentation* of *how* the physical world actually retains its stable appearance and causal regularity. Efficient material causation, rather than being the mainstay of scientific explanation in the manner many contemporary historians of science portray it as having been since the Scientific Revolution, is instead a *phenomenological artifact* of a formal (conceptually designed) and final (purposefully actualized) causation that is metaphysically *fundamental*. Despite their preoccupation with contact mechanisms, the seventeenth-century Christian advocates of the Mechanical Philosophy may objectively be regarded as preserving Aristotelian *formal* causes in their conception of these mechanisms as having been *designed*, and as preserving Aristotelian *final* causes in their recognition of this mechanical design as serving an *intended purpose* in the created order of things. There are many quotations from the period that would make this point, but I offer one from the writings of the scientist Robert Boyle (1627–1691):

> When … I see a curious clock, how orderly every wheel and other part performs its own motions, and with what seeming unanimity they conspire to tell the hour, and to accomplish the designs of the artificer; I do not imagine that any of the wheels, etc., or the engine itself is endowed with reason, but commend that of the workman, who framed it so artfully. So when I contemplate the action of those several creatures, that make up the world, I do not include the inanimate species, at least, that it is made up of, or the vast engine itself, to act with reason or design, but admire and praise the most wise author, who by his admirable contrivance, can so readily produce effects, to which so great a number of successive and conspiring causes are required.[7]

If recognized, this state of affairs also obviates objections to transcendent intelligent causation as lacking a mechanism and therefore being unscientific, since it reduces material efficient mechanisms to mere phenomenological artifacts of an irreducible

and metaphysically basic *transcendent agent causality* that manifests itself in both regular (law-like) and exceptional (that is, complex-specified-information-infusing) ways. This state of affairs also means that the *ultimate* uniformity of nature is not *intrinsic* to it, but rather *extrinsic* to it and *transcendently* imposed upon it. What is more, if we take one of the lessons of quantum theory to be the *insufficiency* of efficient material causation as an explanatory basis for all physical events, we have also implicitly recognized that the uniformity we observe in nature is not just *ultimately* imposed upon it by transcendent intelligent causation, but *proximately* and *continuously* imposed upon it by such a cause as well. As one *PSCF* reviewer astutely (though, alas, not especially sympathetically) observed, accepting this perspective would mean that our scientific theories, particularly when they formulate general laws, are not describing a uniformity inherent in nature itself, but rather a uniformity of divine action (or, as he put it, we would be formulating "general laws describing *God's* behavior"). Indeed we are (Acts 17:28; Col. 1:17; etc.).

It is, thus, not hard to see that methodological naturalism is *not* a necessary assumption for the proper conduct of science and, furthermore, even though it is indifferent to the possibility of divine causality *outside* scientific consideration, it is still fundamentally *inconsistent* with the Christian understanding of how nature functions. Methodological naturalism is not as strong as metaphysical naturalism in that, while it denies transcendent causality a role in scientific explanation, it does not deny the possibility that God exists and might act in history: methodological naturalism only prohibits considering such a possibility in the context of doing science.

A methodological naturalist might be quite sanguine about the possibility of miracles, regarding them as specific actions of God that alter the course of nature for specific purposes, but as lying outside the proper scope of scientific consideration. Nevertheless—aside from the fact that if God does act in history, such a prohibition prevents science from discovering the true cause of the effects in question—there is a much more profound point to be made that reveals methodological naturalism to be in *fundamental tension* with the Christian understanding of the *reason* for nature's regularity. Suppose, as Christians do, that the *correct* explanation for the regularity of nature is the regularity of divine activity. In other words, suppose that nature behaves in a regular manner either because of God's necessary role in sustaining the existence and sufficiency of secondary causes, or because the regularity of nature just *is* the regularity of direct divine action. The former understanding is the one articulated by Aquinas and also adopted by *The Westminster Confession of Faith* (chapter V, section 2). The latter understanding is characteristic of occasionalism, in which God is the *sole* efficient cause of *everything* that happens in that part of the universe not influenced by finite moral agents—such as properly functioning human beings—who can themselves be the fiat initiators of divinely maintained causal chains. Occasionalism, which is my preferred view on quantum-theoretic grounds that mostly exceed the scope of our present discussion,[8] is the understanding of divine providence variously articulated by philosopher-theologians such as George Berkeley and Jonathan Edwards.

The point that now needs making is quite simple: the historically orthodox Christian understanding of God's essential role in the existence of natural regularities is the precise *opposite* of causal closure. Nature is regular *not* because it is closed to divine activity, but rather *because* (and *only* because) divine causality is operative. In orthodox Christian understanding therefore, it is precisely the *failure* of causal closure, and thus the *falsity* of methodologically naturalistic assumptions, that provides the metaphysical basis for the regularity of nature and the possibility of doing science. God's existence and action are not prohibitive of science; they are the *basis* for the very possibility of doing science. What is more, since what is necessary for the practice of science is *just* the regularity of nature, not the absence of the very supernatural causation that provides the basis for it, methodological naturalism is an assumption that succeeds in being both gratuitous and heterodox in equal measure. As Christians, we not only *can* do without it, we *should* do without it. Uniformitarianism will suffice.

Having alluded to quantum theory at several junctures in our discussion, let me press an important point in short compass: while quantum theory gives us highly useful mathematical *descriptions* that allow incredibly accurate empirical *predictions*,

it offers us absolutely *no explanation* of how physical reality *could* conform to such descriptions, nor any explanation of why any *particular* quantum outcome is observed. In short, it gives us *no understanding* of (let alone any real mechanism for) how things *actually* work. Attempts to provide a "mechanism" in the form of local hidden variables (whether deterministic or stochastic) that would provide such an explanation run afoul of quantum-mechanically violated Bell inequalities. So the lesson seems to be that, on pain of experimental contradiction, characteristically quantum-mechanical phenomena *have no physical explanation*. If they have an explanation at all, therefore, it is in the form of a *metaphysical* explanation that *transcends* the physical.[9]

How does this realization affect the two views of providential action mentioned earlier? Given its reliance on natural necessities presumed inherent in created things functioning as secondary causes in their own right, the Thomistic secondary causation model of providence proves inadequate in the quantum realm, among other reasons, due to the failure of sufficient physical causality. On a purely *physical* level in quantum description, while there are probabilistic *constraints* on the behavior of physical systems, most individual quantum outcomes have no sufficient physical cause, and are therefore incapable of being the result of some sort of secondary causation.

The remaining account of divine providence is the occasionalist one, which I take to be preferred on quantum-theoretic grounds. How does it function in the context of our current discussion? In the case of nonlocal quantum correlations, for instance, while there is no *physical* explanation for them subject to relativistic constraints, occasionalism provides a background *metaphysical* context that obviates a certain amount of ontological puzzlement: the correlations have a *nonphysical* common cause in the form of God's direct action in the maintenance of the natural regularities they represent. More succinctly, God is the strong active (sole efficient) cause of quantum correlations and, indeed, of all the quantum phenomena that constitute our experience of the world. As regards the failure of unobserved quanta to have spatiotemporal location and individual substantiality, occasionalism offers a way of dealing with this conundrum too. Since they do not possess any active or passive causal powers, the fundamental constituents of the "material" world are incapable of sustaining their own existence as quasi-localized phenomena. They depend for their existence instead on God's direct action, and so only acquire existence as phenomenological structures in the context of interactive events, which, when they are the subject of measurement, empirically conform to the statistical regularities predicted by quantum theory. The picture this leads to is one in which God, rather than merely sustaining creation in existence from moment to moment, actually creates it *ex nihilo* from instant to instant. What we have, then, is a vindication of the doctrine of *creatio continua*. Arguably, this same metaphysic would emerge from the quantization of physical time on the Planck scale postulated in quantum gravity, so there is a consistency here, even though the justification differs in some ways.

What, more broadly, are the implications of the realization that a metaphysical explanation that transcends the physical is required? Prima facie, as a form of metaphysical abductive inference, it would seem that the existence of the order in nature that ontologically grounds uniformitarian principle—the methodological assumption of *regularity* in the causal structure of the world necessary to the scientific enterprise—finds its best and perhaps *only* justification in theistic metaphysics. It is thus not surprising that theistic conviction historically provided a powerful impetus to the development of science,[10] for it is still the ontological basis on which the practice of science makes the best metaphysical and epistemic sense. Methodological naturalism is therefore not only unnecessary for the practice of science, it forever bars from recognition the metaphysical ground on which scientific investigation is justifiably regarded as a truth-conducive heuristic, and it forever precludes objective scientific recognition of how (and why) the world in which we live and move and have our being actually coheres.

It is transcendent intelligent design that accounts for the regularity of nature and provides the metaphysical justification for uniformitarianism in science. Nature is regular, but it is regular *because* of transcendent causation, not in spite of it. In this metaphysical understanding, *everything* that happens is either divinely intended or—by incorporat-

ing the effects of finite agency—divinely permitted.[11] Recognition of this state of affairs allows for an uncontroversial extension of uniformitarian analysis to intelligent causation. We may therefore recontextualize, in skeleton form, an argument first given sophisticated (and nontheological) articulation by Stephen Meyer.[12] Uniformitarian reasoning infers past causes from present effects under the assumption that the causal structure of the world has remained constant and permits reliable inferences. In this regard, we have a very clear conception of what can happen in the regular course of nature that forms a stable background to human activity, which can then be contrasted with what lies *outside* the regular course of nature and requires the particular and directed action of an intelligent cause. Structures and processes exhibiting a degree of complex-specified information exceeding universal probability bounds[13] are habitually and uniformly associated with intelligent activity. This too is part of the uniformity we experience in the causal structure of the world and, as part and parcel of the uniformitarian assumptions integral to science, falls within the purview of scientific investigation both methodologically and substantively. What we therefore see in the *broader* metaphysical context of providential action, is that God is responsible *both* for nature's regularity *and* for certain exceptional events, but the mode of divine action (regular versus exceptional) associated with each is distinguishable, as indicated, by its characteristics.

The idea that parts of nature might best be modeled using mathematical tools that describe processes that have their end in view before it is achieved, or that characterize structures that result from such processes, is eminently reasonable in a theistic context and entirely compatible with the uniformitarian assumptions necessary to science. Having set aside the false constraint of methodological naturalism and relying instead on a uniformitarian principle that permits recognition from repeated experience of the objective and regular characteristics of intelligent causation, it becomes entirely plausible that nature exhibits a quantifiable teleology, and it furthermore becomes an entirely legitimate *scientific* enterprise to investigate this question. This is, in large part, the mathematical and experimental project associated with intelligent design theory.

Thirty-seven years ago, Nicholas Wolterstorff issued a challenge to the community of Christian scholars and researchers:

> Science and ordinary life can be viewed as on a continuum with respect to the presence of theories and with respect to the actions performed [as a result of belief in] those theories. What is eminently characteristic of science is the use of theories to suggest and guide research programs … Everyone who weighs a theory has certain beliefs as to what constitutes an acceptable *sort* of theory on the matter under consideration. We call these *control* beliefs … [T]he religious beliefs of the Christian scholar ought to function as *control* beliefs within his devising and weighing of theories. This is not the only way they ought to function. For example, they also ought to help shape his views on what it is important to have theories about. Nor does that exhaust their function. But their functioning as control beliefs is absolutely central to the work of the Christian scholar … Seldom, however, do the attempts of Christian scholars to "integrate faith and learning" suggest any research programs within the sciences. I consider this a sign of either a failure on the part of Christian scholars to see how their commitment can and should be related to theory-weighing, or of weakness of imagination. To make some comments at the beginning of a biology course to the effect that all biological reality has been created by God suggests nothing at all by way of any research program within biology. It consists merely of … "setting within a Christian context." … Christian scholarship will be a poor and paltry thing, worth little attention, until the Christian scholar, under the control of his authentic commitment, devises theories that lead to promising, interesting, fruitful, challenging lines of research.[14]

The mission of Christians who are scientific theorizers, field researchers, and experimentalists, should *not be to conform* to the pattern of secular research driven by naturalistic assumptions, *but rather to transform* the practice and impact of science (see Rom. 12:1–2). Intelligent design research is implicitly transformative in this way. As Christians, we must work to show that the patina of metaphysical and methodological naturalism that overlays the practice of modern science is conceptually inappropriate and deeply destructive. The historically

appropriate term—*uniformitarianism*—better conveys the needed conception of scientific methodology than methodological naturalism and allows us to follow the scientific evidence wherever it may lead, including when that research is suggestive of transcendent intelligent causation. And this too is only appropriate, for the theistic worldview not only provides a natural context for the order in the world that science must assume, it also provides what is perhaps the *only* reasonable metaphysical context in which that order can be expected to be intelligible to the human mind. ⌘

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Notes

[1]For a more extensive and differently focused defense of the metaphysical and epistemic necessity of theism as a basis for scientific practice, see Alvin Plantinga's most recent book, *Where the Conflict Really Lies: Science, Religion, and Naturalism* (New York: Oxford University Press, 2011). Plantinga argues that while there is a *superficial conflict* but *deep concord* between science and theism in terms of their historical interaction and present mutual disposition, there is in fact a *superficial concord* but very *deep conflict* between science and metaphysical naturalism. This seems to me exactly right. The deep epistemological conflict between science and naturalism especially manifests itself in the context of evolutionary theory and its implications under the aegis of naturalism for the reliability of human cognition, and these consequences extend not just to science, but to *every* human endeavor.

[2]Robert Bishop, "God and Methodological Naturalism in the Scientific Revolution and Beyond," *Perspectives on Science and Christian Faith* 65, no. 1 (2013): 10–23.

[3]Del Ratzsch, *The Battle of Beginnings: Why Neither Side Is Winning the Creation-Evolution Debate* (Downers Grove, IL: InterVarsity Press, 1996), 47–53.

[4]Hence Murphy explains: "… there is what we might call *methodological atheism*, which is by definition common to all natural science … This is simply the principle that scientific explanations are to be in terms of natural (not supernatural) entities and processes" (Nancey Murphy, "Phillip Johnson on Trial: A Critique of His Critique of Darwin," *Perspectives on Science and Christian Faith* 45, no. 1 [1993]: 26–36). For a critical discussion of the acceptability of "methodological naturalism" and "methodological atheism" as terms appropriate to a Christian understanding of science, see the second part of Loren Haarsma's essay "Christianity as a Foundation for Science," http://www.asa3.org/ASA/education/origins/mn-lh.htm.

[5]Comment from an anonymous reviewer.

[6]See my forthcoming essay, "Quantum Theory, Sufficient Causation, and the Theistic Foundations of Natural Science"; also highly relevant is my essay, "A Quantum-Theoretic Argument against Naturalism," in *The Nature of Nature: Examining the Role of Naturalism in Science*, ed. Bruce L. Gordon and William A. Dembski (Wilmington, DE: ISI Books, 2011), 179–214.

[7]*The Works of the Honourable Robert Boyle* [5 volumes, London: 1744], vol. 1, 447.

[8]See my essays referenced in endnote 6.

[9]Again, see the references in endnote 6 for an extended justification of this assertion and others in the subsequent four paragraphs.

[10]A sound scholarly treatment of this subject in an engaging format may be found in James Hannam, *The Genesis of Science: How the Christian Middle Ages Launched the Scientific Revolution* (Washington, DC: Regnery, 2011).

[11]In stark contrast to methodological naturalism, this is what Boyle, Newton, and almost every other natural philosopher of the seventeenth and eighteenth centuries (and earlier) would have recognized as the proper basis for investigating the regularity of nature.

[12]See Stephen C. Meyer's "Of Clues and Causes: A Methodological Interpretation of Origin of Life Studies" (PhD diss., Cambridge University, 1990) and his book *Signature in the Cell: DNA and the Evidence for Intelligent Design* (San Francisco, CA: HarperOne, 2009), among many other publications. For current exposition, see the extraordinarily rich collection of research papers in Robert J. Marks II, Michael J. Behe, William A. Dembski, John C. Sanford, and Bruce L. Gordon, eds. (forthcoming), *Biological Information: New Perspectives.*

[13]For a technical discussion relevant to the establishment of a universal probability bound, see, for example, Seth Lloyd, "Computational Capacity of the Universe," *Physical Review Letters* 88 (2002), http://arxiv.org/pdf/quant-ph/0110141v1.pdf, doi:10.1103/PhysRevLett.88.237901.

[14]Nicholas Wolterstorff, *Reason within the Bounds of Religion*, 2nd ed. (Grand Rapids, MI: William B. Eerdmans, 1984), 65, 67, 70, 105–6.