



Robert C. Bishop

Article

God and Methodological Naturalism in the Scientific Revolution and Beyond

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There is debate among Christians about whether the sciences presuppose a form of naturalism that rules out the activity and existence of God. Historically, neither natural philosophy, the forerunner of modern scientific inquiry, nor the developing sciences of the eighteenth and nineteenth centuries were based upon such metaphysically naturalistic assumptions. Instead, as a matter of scientific practice, a form of theological neutrality was often the norm. This neutrality can be seen in leaders of the Scientific Revolution. The story of how that neutrality came to be questioned is a complicated one, spanning the eighteenth and nineteenth centuries.

Introduction¹

When discussing the relationship of naturalism to the sciences, it is customary to distinguish two forms. *Metaphysical* naturalism is the philosophical belief that material reality is the only reality. There is no God, nor angels, spirit beings, or spiritual realm. In contrast, *methodological* naturalism (MN) is an approach to scientific investigation that seeks to take phenomena on their own terms to understand them as they actually are.

There is significant confusion among Christians over whether modern scientific investigation requires metaphysical naturalism or whether scientific investigation can be a robust application of MN.

Contemporary Christian debates over naturalism and science tend to ignore the role played by forms of MN in natural philosophy in the ancient and medieval periods. More importantly, our debates usually fail to recognize MN's role in the Scientific Revolution and the practice of modern science from that period forward. There are several strands to this story. I will start by highlighting four theological strands that contributed to the ground-breaking natural philosophy of the seventeenth century that fed directly into MN, and then I will briefly sketch the history of the rise of metaphysical naturalism.²

The Doctrine of Creation: Ontological Homogeneity

Early Christian thinkers struggled with their Greek philosophical and cultural context to formulate the doctrine of creation.³ Natural philosophers in ancient Greece and Rome conceived the celestial realm as being of a qualitatively different order of being (divine, infinite, perfect) than that of the terrestrial (mundane,

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finite, imperfect, changeable). Under such a conception, the celestial and terrestrial realms were treated as being distinctly different from each other. In particular, the purposes for studying the divine and perfect celestial realm differed significantly from those motivating study of the mundane. Moreover, the principles by which the celestial and terrestrial realms operate were considered to be different; hence there was much less application of mathematics, systematic observation, and record keeping to the terrestrial realm with the expectation of discovering regular patterns.

Furthermore, early Christian thinkers had to consider biblical revelation proclaiming that all things were created through and for Christ (e.g., John 1:1–3, Col. 1:16), and their Greek cultural inheritance that taught an eternal universe with qualitatively distinct celestial and terrestrial realms. Eventually the Patristic fathers came to the recognition that if everything was created by and for Christ, then the entire universe was not eternal but a creation *ex nihilo*. This element of the doctrine of creation was wrung from deep reflection on the contrast between the prevailing Greek philosophical views and special revelation.⁴ Part and parcel with creation *ex nihilo* is the Creator/creature distinction, the qualitative distinction between the Creator and that which is created. These central tenets of the doctrine of creation led early Christian thinkers to the realization that the celestial realm, as a created thing, could not be divine.⁵

Still, the power of Greek thought—particularly in Plato and Aristotle—exerted a tremendous pull on early Christian thought, as many Patristics continued to maintain a qualitative distinction between the celestial and terrestrial realms. The former was still considered a realm of changeless perfection and made of a different element (quintessence) than the latter, which was made of the elements earth, water, air, and fire; was imperfect and changeable; and, consequently, was of a lower grade of being. However, some Patristic thinkers—Basil and Philo-
ponus—were able to recognize that the thrust of biblical revelation was that the only distinction in being was that between Creator and created. They argued that the doctrine of creation led to the conclusion that the being of everything created—terrestrial and celestial—is of the same order of being.⁶ Instead of a great chain of being, there was no distinction of

being between celestial and terrestrial realms. Everything created had the same status, that of creature. “The creation is homogeneous in the sense that everything has the same ontological status before God, as the object of his creating will and love. All is ‘very good’ because he created it, mind and matter,”⁷ so that whether mind and matter are qualitatively distinct or not, there was no hierarchy ranking mind over matter or the celestial over the terrestrial.

Philo-ponus traced the consequences of ontological homogeneity to the conclusion that creation has a genuine nature or order. “Philo-ponus insisted that nature could not be understood as the finite representation of infinite reality but as real in itself.”⁸ By implication, all things in creation have genuine natures. In particular, the celestial and terrestrial realms were of the same order of being, implying that the same principles governed the two realms and that they were made of the same matter. The nature of their distinction lay in difference, not order of being. This was the basis for Philo-ponus’s critique of Aristotelian natural philosophy, particularly Aristotle’s account of motion.⁹

The insights of ontological homogeneity were lost during much of the Middle Ages (though recaptured on rare occasions). They eventually reemerged in Duns Scotus, Jean Buridan, and Galileo.¹⁰ Ontological homogeneity became the consensus view among natural philosophers in the seventeenth century, so that it was plausible to give an account of motion that was unified in its treatment of celestial and terrestrial motions (e.g., Newton’s theory of motion).

Divine Freedom

A second theological strand is divine freedom in creation. Although there were longstanding debates about whether God created freely or could only create out of necessity, the former view eventually won out.¹¹ Bishop Tempier of Paris’s 1277 condemnation included, among its 219 prohibitions, a condemnation of teaching that any of God’s acts are done out of necessity. Although not the only theological development that led to an emphasis on divine freedom in creation, the condemnation played a role in motivating a shift to a more empirical approach to understanding the nature of God’s creation, a shift that was already underway in natural philosophy. The renewed emphasis on divine

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freedom in creation often reinforced the need for an empirical approach to the study of creation.¹²

The link between God's freedom in creation and natural philosophical inquiry is neither necessary nor inexorable, and is illustrated in seventeenth-century debates about the laws of nature. For example, if one believed that God created out of necessity, one tended to think that natural laws were discoverable by reason alone (e.g., Spinoza), whereas if one believed God was free to create any world he chose, one tended to think that natural laws were discoverable empirically (e.g., Bayle).¹⁴ The view among many, if not most, natural philosophers of the seventeenth century was that God as sovereign Creator could freely make any creation he saw fit.

One implication of divine freedom in *ex nihilo* creation, the Creator/creature distinction and the ontological homogeneity of creation, was that the creation has *contingent rationality*. The sense of contingency, here, is twofold. First, creation is contingent in that it utterly depends upon God for its very existence (a creation out of nothing tends to fall back into nothing). Second, creation is contingent in that God could have made a wide variety of possible creations. In freedom and love he chose one in particular. Philoponus rightly saw that the contingency of creation implies that we have to investigate it to discover what kind of nature God had given to creation. Moreover, we can have confidence in such investigations because the rationality of God's created order is intelligible; hence the biblical view is that creation's nature is revelatory of itself. By and large, seventeenth-century natural philosophers (Cartesian natural philosophers being an important exception) followed this line of thought, emphasizing that empirical means were best suited to discovering the nature of creation.

Two Books Metaphor

The two books metaphor—creation and the Bible are two different books whose ultimate source is God—also has a long history, going back at least as far as Origen of Alexandria. Although theologians tended to view the book of nature as a source of general revelation about God, natural philosophers tended to argue that the book of nature also revealed the workings of creation.¹⁵ Galileo is one of the most well-known proponents of this view. He argued that the

book of nature was written in the language of mathematics and revealed the nature of creation.¹⁶ Galileo gave voice to the growing application of mathematics to all areas of natural philosophy of the sixteenth and seventeenth centuries: To properly read or understand creation's processes, laws, and so forth, requires quantifying them so as to understand as accurately as possible their created natures given by God. Kepler, in a letter to J. G. Herwart von Hohenburg, March 26, 1598, put it like this:

as we astronomers are priests of the highest God in regard to the book of nature, we are bound to think of the praise of God and not of the glory of our own capacities ... Those laws are within the grasp of the human mind; God wanted us to recognize them by creating us after his own image so that we could share in his own thoughts.¹⁷

Kepler believed that the language of mathematics was crucial to "thinking God's thoughts" about the nature of creation, and he took seriously the role of astronomers as priests articulating God's book of nature.¹⁸

The Fall and Knowledge

Along with the infusion of new knowledge of mathematics and natural philosophy from the translation of Islamic texts, the ancient struggles with skepticism were rediscovered through either the translation of Islamic texts or the discovery of long-forgotten texts in monasteries. Space does not permit exploring how the renewal of that struggle in Renaissance thought contributed to the effort to develop a mitigated or constructive skepticism leading to a seventeenth-century epistemology of experiment.¹⁹ However, one important theological strand in this story is the explicit linkage of error and cognitive limitations, as sources of skepticism, with sin and the Fall.

As Peter Harrison argues, many—though not all—seventeenth-century discussions of error and limitations on human reason were deeply colored by a biblical understanding of sin and the Augustinian conception of the Fall.²⁰ Although there was disagreement on how thoroughly the Fall affected the capacities for knowledge, there was wide agreement that instruments and/or procedures had to be developed to overcome the epistemic consequences of the Fall and other skeptical worries to the degree possible.²¹ One of the goals of these mitigation attempts was to restore as much as possible of the human

capacities to know the nature of creation genuinely. This epistemological project was daunting, however. Although there was theological grounding in the doctrine of creation for thinking that creation was orderly and intelligible, coming to understand creation's nature was generally considered to be a difficult and arduous task. Natural philosophers of the seventeenth century knew that creation did not yield her secrets easily, and was not fully knowable or understandable to finite minds. Still, the epistemic goal was to understand the nature of God's creation—the laws, parts, properties, and processes—to the fullest extent humanly possible. The birth of modern science—its experimental and mathematical methods—was not a byproduct of a renewed confidence in reason, as we are often told, but a healthy appraisal of the deficiencies and limitations of human capacities for knowing.²²

Pulling the Strands Together

The doctrine of creation's emphasis on *ex nihilo* creation and ontological homogeneity, the impact of divine freedom in creation, the idea that creation could be read as a book, and the skeptical attitude toward human capacities to know—along with other strands I have not mentioned—fed into the same conclusion: To understand creation requires taking the nature of created things on its own terms. Hence, methods and approaches to knowing had to be constructed that enabled natural philosophers to be in the best position to discover and explore the objects and phenomena of creation. To put the point in terms popular in the seventeenth century, natural philosophers realized that they needed modes of inquiry that could focus on making known the nature of the secondary causes through which God worked in creation. This was not a set of tasks that could be carried out by reading the book of Scripture, but by learning how to read the book of nature accurately.

This seventeenth-century focus on secondary causes rather than on the Bible—what we would recognize as a form of MN—was what guided natural philosophers in their study of created natures, on their own terms, to understand them as accurately as possible. In other words, for these natural philosophers, MN was a commitment to particular methods of inquiry *for a particular limited purpose*: To

understand the nature of the matter, forces, and laws that God had made. Many of the scientific revolutionaries thought that to fulfill this purpose required a quantifiable, empirical approach to studying nature in contrast to a purely rationalistic approach or one that tried to read the nature of creation solely from the Bible. However, seventeenth-century natural philosophers—whether empiricists or not—were united in their conviction that the ultimate goal was understanding what kind of creation God had made and how God was at work in and through creation. Focusing on so-called natural causes, for them, in no way implied that God was absent from creation nor even that God was somehow excluded from explanations of how creation worked.

This “naturalistic” or neutral focus has been part and parcel of natural philosophy from ancient times.²³ For Christians engaged in natural philosophy during the medieval period and into the early modern period, the commitment of many to a form of MN is articulated well in David Lindberg's summary of Albertus Magnus. In the thirteenth century, Magnus proposed distinguishing

between philosophy and theology on methodological grounds and to find out what philosophy alone, without any help from theology, could demonstrate about reality. Moreover, Albert did nothing to diminish or conceal the “naturalistic” tendencies of the Aristotelian tradition. He acknowledged (with every other medieval thinker) that God is ultimately the cause of everything, but he argued that God customarily works through natural causes and that the natural philosopher's obligation was to take the latter to their limit ... Albert pointed out that God employs natural causes to accomplish his purposes; and the philosopher's task is not to investigate the causes of God's will, but to inquire into the natural causes by which God's will produces its effect. To introduce divine causality into a philosophical discussion ... would be a violation of the proper boundaries between philosophy and theology.²⁴

Examples from the Scientific Revolution

Tycho Brahe, Johannes Kepler, Galileo Galilei, Robert Boyle, and Isaac Newton are just some of the names associated with the Scientific Revolution.²⁵ Here,

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I will focus on Boyle and Newton as practitioners of MN in the spirit of Magnus.

Boyle

Much recent scholarship clearly demonstrates that theological motivations lay behind Boyle's approach to natural philosophy and informed his approach to studying creation.²⁶ While he believed God could intervene in the natural course of things, Boyle conceived the task of natural philosophy as studying and understanding creation on its own terms. As he puts it in *The Christian Virtuoso*, "For [natural philosophers] consult experience both frequently and heedfully; and ... they are careful to conform their opinions to it; or if there be just causes, *reform their opinions by it.*"²⁷ This is one of many places where he makes it clear that natural philosophy's task is to explain phenomena of creation in terms of natural processes.

For Boyle, then,

Nature is a "book" written by an omniscient and omniscient author ... One cannot reason on purely a priori grounds about such a divinely created product, because God's reason and power extend far beyond human faculties. Rather, one must look at nature—read the text—in order to determine what was actually done. The world is like a text. It is a coherent, albeit extremely complex, whole. To understand any part of the great cosmic mechanism, the relations that hold between that part and the rest of the whole have to be known ... For Boyle, the experimental method was a means by which one could "interpret" the book of nature ... the experimental philosophy was designed as a method of interpretation.²⁸

Boyle believed that God's two books were distinct, though related:

He was opposed to any "unwholesome mixture" of the two disciplines [study of Scripture, study of nature]. The two books could be used to shed light on each other, but care was required so as not to confound them.²⁹

In the book of nature was to be found detailed knowledge of the creatures mentioned in the Bible. The doctrine of creation, drawn from special revelation, could teach us that all the details of nature have a purpose in God's plan and that explanatory frameworks such as atomism cannot be understood atheistically on pain of adopting an incoherent foundation.

Boyle defended the idea that biblical studies were superior to natural theology for learning about God and his activity.³⁰ In contrast, the study of creation was superior to biblical studies for learning about the particulars of creatures and natural principles.³¹

For Boyle, the process of coming to understand creation was very similar to that of coming to understand a text.

The goal of understanding nature, as God's production ... [required] the same type of hermeneutic principles that were employed for an actual text, as constraints upon the theories that we construct for the "explanations" of nature's processes ... Boyle's choice of method was guided by his ontological view of nature as a divine text.³²

Hence, Boyle's experimental approach to inquiry was a means for gathering as much information as possible about creation's processes for the construction of "the most coherent interpretation of how the particulars of nature are connected into one grand cosmic mechanism."³³

With respect to MN, then, Boyle argued that it was illegitimate to explain the operations of natural phenomena in terms of the actions of spiritual beings, because such explanations gave us no insight into the physical nature of the phenomena and the principles by which they operated.³⁴ Without denying that God was the Creator, Sustainer, and Governor of the entirety of creation, Boyle sought to study and understand natural phenomena without "intermeddling with supernatural mysteries."³⁵ It was inappropriate to invoke God or other spiritual entities in the explanations of the detailed workings of creation *if the task was to understand those workings on their own terms*. For Boyle, rational and practical engagement with creation was the only means for us to increase our knowledge of the phenomena of creation on their own terms.³⁶

Ultimately, for Boyle, the better we understand things of nature on their own terms, the better positioned we are to think theologically about creation and to see God's purposes in these things. Boyle's "epistemological conception of the progressive nature of knowledge entailed the belief that it could only be achieved through a complex process of interpretation and the reconciliation of truths from all areas of learning."³⁷ His pattern for relating natural philosophy to biblical knowledge and theology was

to treat these domains as distinct but related, working out the nature of matter and secondary causes, then turning to think biblically and theologically about those discoveries.³⁸

Of course Boyle was not working in a vacuum; he was following a well-established tradition. For example, Tycho Brahe had articulated a multipronged approach to understanding the cosmos that involved mathematical astronomy, natural philosophy, and biblical/theological study as three distinct fields of knowledge that had a complex interrelationship.³⁹ However, it was Kepler who combined a resolute commitment to discovering the truth about the universe as God made it with a view of mathematical astronomy as having a genuine correspondence with the causes of the motions of the planets.

Kepler also distinguished the disciplines of theology from natural philosophy and astronomy. For instance, in his *Astronomia Nova*, Kepler writes that “while in theology it is authority that carries the most weight, in philosophy it is reason.”⁴⁰ It was not uncommon in sixteen- and seventeenth-century Europe for theology and natural philosophy to be treated as distinct domains of knowledge—having some partial overlap—that drew on distinct methods. But it was Kepler who brought realism into theorizing the nature of the heavens, for example, that hypotheses about planetary motion should involve genuine causes of that motion rather than merely being mathematical constructs that accurately reproduce observations. In this way, Kepler saw himself as an “exegete of the Book of Nature.”⁴¹

Newton

One of Newton’s great contributions to natural philosophy was to marry mathematical modeling and experimental observations in a form familiar to us in contemporary physical science. He used thought experiments involving simplifications and idealizations of realistic situations, developed mathematical models for these idealized situations, applied idealized models to real situations comparing results with observations, and systematically refined the simplifications and idealizations until the models achieved experimental agreement. In this way, he was able to work out the mathematical form of gravity and other forces.⁴²

Newton’s methodology was an attempt to understand forces on their own terms, namely, as secondary causes through which God works in creation, with the ultimate aim being to “know by natural philosophy what is the first Cause.”⁴³ Newton, though doubting that Christ was co-eternal and equal to the Father, nevertheless viewed Jesus as a key mediator through whom creation was made.⁴⁴ Christ served a vice-regent role, not only as the Creator of all things, but also as overseeing and directing the forces causing the motion of material bodies, while God the Father worked through gravity as an expression of his omnipresence.⁴⁵

Therefore, for Newton, MN in the form of experiment and mathematical modeling was in service of revealing God’s wisdom and glory in creation, through demonstrating its uniformity and intelligibility rather than expunging God from natural philosophy. Similar to Magnus and Boyle, Newton recognized,

That religion & Philosophy are to be preserved distinct. We are not to introduce divine revelations into Philosophy, nor philosophical opinions into religion.⁴⁶

Hence, he also endorsed MN as the appropriate way to study the secondary causes of creation. For instance, in a letter to Richard Bentley, Newton maintained that if God chose to produce gravity mechanically, then a mechanical cause should be sought. However, if God chose some other means, the phenomenon of gravity was still genuine and law-like.

Gravity must be caused by an agent acting constantly according to certain laws, but whether this agent be material or immaterial is a question I have left to the consideration of my readers.⁴⁷

In other words, gravity has God as its primary cause even if Newton was unable to discover the nature of its secondary cause.

God caused gravitational attraction by his omnipresent activity according to principles that he had established, called by Newton “active principles” or “laws of motion.” Working in accord with these principles, God animated nature, providing life to a world of dead matter.⁴⁸

Although the idea that God’s activity in creation was always mediated was steadily declining in the seventeenth century,⁴⁹ Newton seems to have continued

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maintaining that God accomplishes his purposes in creation through means. Newton's universe was far from the clockwork machine, with God as a distant supervisor.⁵⁰ Furthermore, as with Magnus, Kepler, and Boyle, Newton viewed biblical studies, theology, and natural philosophy as distinct enterprises, yet as interacting fields of knowledge relating to one another.⁵¹

The Turn to Metaphysical Naturalism

If the scientific revolutionaries were theists who deployed MN in the service of discovering the nature of God's creation, then what happened in the intervening centuries such that the sciences and their methodologies now are routinely disassociated from God? I will start by briefly tracing four trends in the transformation of religion in the eighteenth century that set much of the scene for this dissociation. While many parishioners in the pew may not have gone very far in the direction of these trends, many natural philosophers, theologians, pastors, and writers of the eighteenth century did.

1. Even in the seventeenth century, the rich biblical picture of divine action in creation as mediated—taking place through or being shaped by divine command, Jesus and the Spirit, and ministerially through creation itself—had largely been reduced to just mediation through divine command. Increasingly, the laws of nature became the key mediators of everything that happened in creation. Although Newton managed to maintain a richer sense of divine mediated action in creation, the generation of Newtonians after him did not.⁵²

2. Following Augustine, medieval philosophy and theology stressed God's will and power in creation. As a consequence, God's ultimate relationship to creation as one of covenantal love often fell out of the focus of Western thinkers. Hence, voluntarism usually sounded notes about God's will in creation being arbitrary. Under the growing conception of creation as a machine designed by a Master Engineer, by early in the eighteenth century the very idea of God arbitrarily and unpredictably intervening in creation became psychologically jarring to the majority of theists.⁵³ A mechanical picture of creation

absent a rich doctrine of creation seemed to imply deism, but there was psychological pressure in this direction, too.

Deism sprang to full flower in the eighteenth century with the laws of nature mediating all that happened in creation, instead of Jesus, serving as mechanical vice-regent. The culmination of this line of development was *providential deism*, the idea that "God's beneficence" consisted solely "in constructing the world so that it conduced to good."⁵⁴ The Master Engineer was so gracious and wise that creation, from its beginning, had been given all the resources it needed to achieve the good that God had set for it. No interventions in the natural order were needed. Providential deism of the eighteenth century did have one crucial advantage over older understandings of providence with respect to the temper of the times: instead of invoking mysterious actions of God in creation, everything was accomplished through natural laws and processes, which were accessible to reason and observation.

3. Natural theology underwent a shift in the seventeenth century that had a significant influence in the eighteenth century (although this is not to say that all natural theology fell into this one pattern). Whereas Newton still maintained that God's existence, wisdom, and power were best demonstrated by the total order exhibited by the system of the world, most theists followed the lead of Boyle and John Ray's *The Wisdom of God Manifested in the Works of the Creation* (1691) in looking to particular features of creation for evidence of God's existence, wisdom, and power (e.g., organs such as the eye and hand, and organisms exquisitely suited to their environments).⁵⁵

Early in the eighteenth century, every area of natural philosophy was marshaled for natural theology. By the end of the eighteenth century, most natural philosophers and theists admitted that the details of astronomy, physics, chemistry, and geology were ambiguous at best, regarding evidence for a Deity other than the natural laws which still pointed to a wise Creator.⁵⁶ Only what would become biology—the study of organisms and their relations to their environments—was generally acknowledged as being replete with exquisite examples of the Master Engineer's hand.

4. Closely related to this shift in natural theology was a shift in the appraisal of the relationship between reason and revelation. Already by the mid-seventeenth century, the Socinians had elevated human reason to a high role in faith and biblical interpretation. As the seventeenth century progressed, both theologians and natural philosophers had a tendency to promote natural revelation—God’s book of nature—to being on par with the Bible. As belief was being transformed into rationally verified propositions—a transformation begun in the sixteenth century and completed in the eighteenth⁵⁷—the Bible and faith were being torn in two directions: intellectual assent based on demonstrated propositions vs. arational trust and love. In the eighteenth century,

Deism professed to be a religion founded on reason alone, composed solely of truths about God evident in the order of nature, subjecting all beliefs to the test of reason and experience.⁵⁸

For some theists in the early eighteenth century, Scripture became optional because they believed that whatever revealed truths there were in the Bible could be ascertained from reason and experience alone. It did not take long for a number of theists to conclude that the Bible was suspicious because reason and experience could not demonstrate many things found in Scripture, such as the Trinity, the Incarnation and resurrection, and miracles. Whether because the Bible was viewed as redundant or as suspicious, as the eighteenth century rolled on, a large number of theists discarded Scripture and formulated their beliefs about God based solely on reason and experience. Human reason had been elevated above revelation for many theists. Still, deism “rested squarely on the rational necessity of God,” a conviction that even Voltaire could not rationally deny.⁵⁹

Despite all these religious changes, at the end of the eighteenth century forms of MN were still the rule of the day among natural philosophers, still the appropriate way to understand the nature of God’s creation even if, for most of them, God was a distant spectator. A sharp distinction was maintained between theological proofs for God based on science, and scientific conclusions about the nature of creation. The latter were “held to be strictly confined to the naturalistic subject matter of the individual science.”⁶⁰ And so things continued well into the nineteenth century. Yet, what a difference from the

seventeenth century! By the 1830s, “Scientists with the large exception of biologists, needed God now only as a First Cause, the Author of natural laws. The laws themselves explained what actually happened.”⁶¹ Rationalism in religion ran strong, and not only among natural philosophers and scientists.

The great wave of rationalizing that had gathered theological force since Newton’s day found ardent disciples among nineteenth-century churchmen. The most striking religious minds of the century—such as Schleiermacher in Germany, Coleridge in England, Emerson in America—distinguished themselves by swimming against this tide. But more representative theologians dove into quasi-scientific natural theology with a zeal that would have done credit to any Enlightenment rationalizer.⁶²

Trends dating back to before the early modern period are instrumental to understanding the significant shift represented in the nineteenth-century narrowing of all forms of knowledge down to one. This complicated set of mutually shaping and reinforcing intellectual trends involved the rise of ever-narrowing models of rationality and knowledge; the drive for quantification, mercantilism, and capitalism; bureaucratization; secularization; changes in the conception of persons (e.g., individualism) and society; and the stunning successes of the natural sciences.⁶³ By mid-nineteenth century, to count as knowledge was to be a concrete proposition about tangible reality that is demonstrable via logic or experience. This was the positivist ideal of knowledge in which the exemplars were (1) tangible facts, material objects, demonstrable truths, laws, and principles, (2) exact in the sense of logically or mathematically precise, and (3) verifiable through logic, observation, and experiment. This ideal held for all knowledge (e.g., scientific, mercantile, and theological).

The religious implications of this positivist model of knowledge were disastrous. First, faith was now viewed as an altogether different category from knowledge and truth. Second, God was treated as an object of natural knowledge in parallel with balance sheets and chemical compounds.⁶⁴ Clergy in the nineteenth century were at least as much to blame as the scientists for religious knowledge being reduced to this narrow ideal.⁶⁵

By 1859, the intellectual space, making agnosticism and atheism sustainable ways of life, was fully

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constructed just in time for the publication of Charles Darwin's *On the Origin of Species*.⁶⁶ In 1869, Thomas Huxley coined the term "agnosticism" to describe "a permanent suspension of belief in God. This settled inability to accept the reality of God, rather than positive atheism, became the distinctively modern unbelief."⁶⁷

The intellectual trends surveyed so far continued their development, leading to the importation of metaphysical naturalism into science. Against this backdrop, some key developments were as follows:

1. To those theists who had built their natural theology on reason and experience alone, the publication of *On the Origin of Species* in 1859 delivered what registered as a psychological blow to the argument for design. Darwin was able to offer an account of how organs and species might become well suited to their environments through evolutionary mechanisms such as natural selection.⁶⁸ Biology had been one of the last scientific domains which seemed to offer direct evidence of God's creative activity in nature, and for many people, Darwin appeared to have knocked out that line of evidence. Explanations for organs and organisms in terms of natural processes seemed much more credible to many. The possible exception was the origin of life itself in which God might still be necessary. But God's role as First Cause

dissipated into mist. Most scientists, qua scientists, simply stopped talking about such metaphysical questions. Many of the amateurs of science, taking their cue from Herbert Spencer, solemnly if vaguely invoked Force as the primal creative power inherent in the universe [leaving the idea of a purposive Creator aside]. Those who invoked Force as a creative power believed themselves to be speaking science. That they were, for the most part, speaking hokum only underlines again the enormous appeal of scientific explanations.⁶⁹

2. Darwin's emphasis on natural processes for scientific explanations followed a pattern already set in explicit discussions of scientific methodology in the first half of the nineteenth century (e.g., Herschel and Lyell).⁷⁰ These nineteenth-century discussions—conducted by Christians and other theists—built on the methodological traditions of the seventeenth century (and even earlier as in Magnus). Darwin's constant complaint about appeals to divine creation

of species was that they are not scientific explanations because they did not tell us how secondary causes were involved in the natural history of organisms (his explanatory complaints have nothing to do with questions about God's existence).

Even in the aftermath of Darwin's publications, Congregational minister and geologist George Fredrick Wright defended MN on Christian grounds in an 1876 issue of *Bibliotheca Sacra*:

It is not in accordance with what we specially value in the modern habits of thought, to cut the Gordian knot with the simple assertion, "so God has made it," ... Such a course would be suicidal to all scientific thought, and would endanger the rational foundation upon which our proof of revelation rests. It is superstition and not reverence, which leads us to avoid the questions concerning the order and mode of the divine operations ... We are to press known secondary causes as far as they will go in explanation of facts. We are not to resort to an unknown cause for explanation of phenomena until the power of known causes has been exhausted. If we cease to observe this rule there is an end to all science and of all sound sense.⁷¹

Wright goes on to invoke Newton's example of forces as the scientific explanation for God's activity in the heavens. Hence, many Christians still viewed science as revealing God's laws in creation, whereas many theists and all agnostics and atheists viewed science as silent on God.⁷² In the last third of the nineteenth century, some who adopted the latter view veered into scientism—the philosophy that only scientific methods deliver knowledge and only scientific knowledge counts. This camp was composed of some scientists who were bent on undermining and marginalizing the Anglican Church in England, and several nonscientists who were completely enchanted by science but hardly understood what it was.⁷³ Scientism was the logical endpoint of the overly narrowed model of knowledge described above. Unfortunately, this minority late nineteenth-century view became quite influential, seeping into all manner of intellectual cracks and crevasses in contemporary culture.⁷⁴

3. In the wake of *On the Origin of Species*, anthropological explanations for the origin and development of religion gained much greater plausibility in intellectual circles. In 1873, Robert Ingersoll summarized

the trend of these anthropological explanations: "Every new religion has a little less superstition than the old, so that the religion of science is but a question of time."⁷⁵ If God and religion could be accounted for by natural sociological developments, so the thinking went, then supernatural explanations were superfluous and dubious.

4. The uniqueness of human beings as distinct from the rest of the animals became highly questionable in the second half of the nineteenth century. We are told in special revelation that humans are made in God's image; over the centuries, that image was interpreted as various forms of distinctness from the rest of creation. Yet, by this period, "biblical evidence" held no sway over many thinkers. Instead, under the reigning model for knowledge, human distinctiveness had to be "scientifically discernible." Since nineteenth-century developments in neurophysiology were progressively demonstrating that human consciousness and cognition were crucially linked to our brains and that our brains were very similar to those of the great apes, evidence for human distinctiveness appeared to be lacking. Humanity was becoming more naturalized in the minds of many, while our ability to know supernatural things, such as God, immortality, and the soul, appeared outside the reach of knowledge. Ingersoll articulated the sense of the age for many thinkers: "Beyond nature man cannot go even in thought—above nature he cannot rise—below nature he cannot fall."⁷⁶

All of the preceding trends developed within a doctrine of creation so atrophied that a pernicious false dilemma was solidly in place by the end of the eighteenth century:

Events in creation either happen due to God's unmediated intervention or due to natural processes without any divine influence whatsoever.⁷⁷

Outside of Christian circles, few thinkers believed that natural processes were God's ordinary ways of working in creation (even many Christians fell sway to viewing God as absent from natural processes). So the second branch of the false dilemma pictured the world of distant deism, completely cut off from God. It is not surprising, then, that between widespread rising skepticism about whether knowledge of God was possible and widespread focus on natural processes, nineteenth-century sciences largely dis-

pensed with invoking God in explanations. Metaphysical naturalism was fast becoming the norm in educated circles (save largely for Christian thinkers). Turner summarizes the 1860s–1880s this way:

Although many scientists clung to the faith that their work pointed to God, God no longer formed a necessary part of the scientific understanding of reality.⁷⁸

The rise of metaphysical naturalism was complete by the 1880s. What was called natural philosophy through the 1850s still shared many metaphysical interests that were inviting toward theism. But the new post-1850s discipline known as "science" had a much narrower nonmetaphysical focus:

a narrowing of the range of valid scientific knowledge so as to exclude all inferences about supposed nonphysical realities. The older idea of [natural philosophy], prevalent through the early decades of the [nineteenth] century, envisioned a spacious and rather laxly policed territory of [natural philosophic] knowledge. [Natural philosophy] meant something like "orderly and methodically digested and arranged" knowledge of nature. No fortified frontiers prevented [natural philosophy] from exploring metaphysical as well as physical questions about the natural world [witness Boyle and Newton] ... In effect, science by fiat redefined its meaning of "natural" so as to preclude the traditional necessity of a supernatural on which nature depended. It did this de facto, not by denying the supernatural, but by refusing to consider as within the bounds of scientific knowledge anything but the physical. This was at root why scientific laws had to be reconceived as merely observed regularities rather than manifestations of divine will ... The prodigious American physicist Joseph Henry defined as essential to a "scientific truth" its enabling "us to explain, to predict, and in some cases to control the phenomena of nature." But what could be accurately predicted was inherently limited to what could be carefully and precisely observed; that is, to physical reality. Thus, this predictive drive demanded ever more rigorous verification by physical evidence of scientific hypotheses. *Hypotheses projected beyond human experience of the natural world—even if formed by it—are worthless ... because we have no way of testing them. The very purpose of modern science forced it gradually but inexorably to narrow its focus to physical reality alone.*⁷⁹

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Most American scientists in this period were Christians or at least theists, though they perhaps did not notice how metaphysical naturalism came to replace MN in scientific practice for so many of their non-Christian colleagues.⁸⁰

Conclusions

There is a long history of religious neutrality in natural philosophy from the ancient Greeks to Medievals such as Magnus; to methodological revolutionaries such as Kepler, Boyle, and Newton; to nineteenth-century scientists such as Wright. Historically, then, metaphysical naturalism arises much later than what we today call MN, coming to flower in the latter half of the nineteenth century. Hence, metaphysical naturalism is not a necessary presupposition for MN. While it is tempting to see the rise of metaphysical naturalism as the ontologizing of methodological naturalism—and there is some truth to this diagnosis—metaphysical naturalism is not explainable without a host of other mutually reinforcing intellectual trends indicated above.⁸¹

Moreover, as the doctrine of creation slowly atrophied over the course of the seventeenth century and took a nosedive in the eighteenth century, natural philosophic explanations—what we would now call scientific explanations—gradually began to be viewed as replacements for God’s active involvement in creation rather than being viewed as possible explanations for *how* God worked in creation (hence the false dilemma mentioned above, regarding understanding how events in nature happen).

Methodological naturalism presupposes no such competition with or replacement of God’s working in creation. In the seventeenth-century context, such neutrality functioned as an injunction to understand nature on its own terms, implying natural philosophers did not invoke God’s *unmediated* action in creation to explain events and patterns in creation. The ultimate purpose of MN was to glorify God through understanding secondary causes much in the spirit of Magnus.⁸²

Unfortunately, since the end of the nineteenth century, MN has often been confused with metaphysical naturalism. For instance, Brad Gregory describes MN as

the methodological postulate of metaphysical naturalism, which entails that for science to be science, by definition it can pursue, identify, and entertain only natural causes as plausible explanations of natural phenomena, with the universe as a whole regarded *as if it were a closed system of natural causes*.⁸³

And Bruce Gordon says that MN

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*.⁸⁴

Since MN has nothing to do with metaphysical naturalism, to formulate MN in terms of such naturalism betrays a serious lack of historical understanding of the concept as well as a lack of clear thinking about the distinction between methodological naturalism and metaphysical naturalism.

It is also important to note an insidious side effect flowing out of the seventeenth-century emphasis on God’s rule of creation through laws for thinking about creation: While God as Ruler, through laws, came to central stage in books and pamphlets written by natural philosophers, God as Redeemer receded into the shadows. This theological shift in emphasis corresponds to a focus on God’s will, wisdom, and power in relation to creation at the expense of his covenantal love for creation and plan of salvation. Although often ignored in historical accounts, this theological shift was an important strand contributing to the eighteenth-century idea that a perfectly wise Creator would make a creation that requires no divine interventions whatsoever. The intuition was that it would be demeaning to the grandeur of a Creator if he had to do anything in creation after its origin (an intuition that is alive and well in contemporary atheist writings such as Richard Dawkins’s *The God Delusion*). This intuition was crucial to the rise of providential deism in the eighteenth century which, in turn, accelerated the separation of natural philosophy from faith/theology.

Nevertheless, natural philosophers involved in the Scientific Revolution uniformly believed that their efforts to understand the universe were efforts aimed at understanding God’s creation—understanding the characteristics of things *he had made*. The pursuit of observational, experimental, and

mathematical methods of investigation as a means of understanding the nature of God's creation that were distinct from theological means, was fully justified in their minds by their commitment to some robust version of the doctrine of creation in which nature was a creation of God. As such, they saw that methodological naturalism was the appropriate theistic stance to take toward the study of nature. ❧

Notes

¹This is an expanded version of a talk given at the 66th Annual Meeting of the American Scientific Affiliation in Naperville, Illinois, July 28–August 1, 2011. I thank Ted Davis, Ron Numbers, and anonymous referees for their constructive comments, saving me from several embarrassments. Any remaining embarrassments are solely my responsibility.

²Some, such as Bruce Gordon ("In Defense of Methodological Neutrality," 66th Annual Meeting of the American Scientific Affiliation, July 28–August 1, 2011), question the applicability or projectability of MN as a characterization of scientific work prior to the late nineteenth century because they see its contemporary usage as inextricably intertwined with metaphysical naturalism.

³As Colin Gunton points out, "[T]here could be no doctrine of creation without the setting in which it was hammered out," in *The Triune Creator: A Historical and Systematic Study* (Grand Rapids, MI: Eerdmans, 1998), 41.

⁴For example, in his unfinished *Literal Commentary of Genesis*, Augustine noted that the "plain sense" of Gen. 1:1–2 was that God began his work of creation with (probably eternally) preexistent matter (a reading of Gen. 1:1–2 that his Manichean opponents favored). In contrast, Augustine argued that these verses pointed to the deeper meaning, that God had created *ex nihilo*, because we know from the New Testament that God is the Author and Founder of all things, and this implies that matter has a beginning through God (hence, it cannot preexist God's founding creative acts). So Gen. 1:1–2 must mean—contrary to the "plain sense"—that God initially created matter.

⁵For a fuller treatment of the doctrine of creation, see Gunton, *The Triune Creator*, and Robert C. Bishop, "Recovering the Doctrine of Creation: A Theological View of Science," http://biologos.org/uploads/static-content/bishop_white_paper.pdf.

⁶For example, Philoponus argued that the Sun was composed of fire as ordinarily found on Earth, in *Commentary on Aristotle's 'Meteorology'*, ed. M. Hayduck, *Commentaria in Aristotelem Graeca* (CAG) 14.1 (Berlin: Reimer, 1901), 49. He also argued that the motions of the planets could be explained by an impetus impressed upon them by God, the same form of impetus at work in terrestrial phenomena such as the motion of arrows and rocks, in *On the Creation of the World (De opificio mundi)*, ed. W. Reichardt (Leipzig: Teubner, 1897), I.12. The dynamics of motion was the same in the heavens as it was on Earth.

⁷Gunton, *The Triune Creator*, 72.

⁸Harold P. Nebelsick, *Renaissance and Reformation and the Rise of Science* (Edinburgh: T&T Clark, 1992), 13.

⁹Joseph L. Spradley, *Visions That Shaped the Universe: A History of Scientific Ideas about the Universe* (New York: McGraw-Hill, 1994), 51–6.

¹⁰Nebelsick, *The Renaissance*; Spradley, *Visions That Shaped the Universe*; Gunton, *The Triune Creator*.

¹¹Nebelsick, *The Renaissance*; Gunton, *The Triune Creator*.

¹²R. Hooykaas, "The Rise of Modern Science: When and Why?," *The British Journal for the History of Science* 20 (1987): 453–73; Toby E. Huff, *The Rise of Early Modern Science: Islam, China and the West* (Cambridge: Cambridge University Press, 1993), 104–6, 179–89, 339–42; Edward Grant, *The Foundations of Modern Science in the Middle Ages: Their Religious, Institutional and Intellectual Contexts* (Cambridge: Cambridge University Press, 1996), chaps. 5–8; Gunton, *The Triune Creator*, 106–7; Edward B. Davis, "Christianity and Early Modern Science: The Foster Thesis Reconsidered," in *Evangelicals and Science in Historical Perspective*, ed. David N. Livingstone et al. (New York: Oxford University Press, 1999); David D. Lindberg, *The Beginnings of Western Science: The European Scientific Tradition in Philosophical, Religious, and Institutional Context, Prehistory to AD 1450*, 2nd ed. (Chicago, IL: University of Chicago Press, 2007), 233–53.

¹³J. R. Milton, "Laws of Nature," in *The Cambridge History of Seventeenth-Century Philosophy*, ed. Daniel Garber and Michael Ayers (Cambridge: Cambridge University Press, 1998), 680–701.

¹⁴There is a further distinction among natural philosophers regarding divine freedom. If one believed that God's freedom in creation was exercised in service of reasons accessible to human minds, then one tended to think that reason alone could arrive at the true laws of nature (e.g., Descartes).

¹⁵Kenneth J. Howell, *God's Two Books: Copernican Cosmology and Biblical Interpretation in Early Modern Science* (Notre Dame, IN: University of Notre Dame Press, 2002); Klaas van Berkel and Arjo Vanderjagt, eds., *The Book of Nature in Early Modern and Modern History* (Leuven, Belgium: Peeters Publishers, 2006); Mary L. VandenBerg, "What General Revelation Does (and Does Not) Tell Us," *Perspectives on Science and Christian Faith* 62, no. 1 (2010): 16–24.

¹⁶For example, see Stillman Drake, *Discoveries and Opinions of Galileo* (New York: Anchor Books, 1957), 173–216.

¹⁷Carola Baumgardt, *Johannes Kepler: Life and Letters* (New York: Philosophical Library, 1951), 44, 50.

¹⁸For instance, see Gerald Holton, *Thematic Origins of Scientific Thought: Kepler to Einstein*, rev. ed. (Cambridge, MA: Harvard University Press, 1988), 68–9. This momentum for mathematizing more and more of nature received its biggest impulse in the infusion of new mathematical learning and practice from the many Islamic texts that flowed back into Medieval and Renaissance Europe.

¹⁹See Richard H. Popkin, *The History of Skepticism from Erasmus to Spinoza* (Berkeley: University of California Press, 1979), and *The History of Skepticism: From Savonarola to Bayle* (Oxford: Oxford University Press, 2003).

²⁰Peter Harrison, *The Fall of Man and the Foundations of Science* (Cambridge: Cambridge University Press, 2007).

²¹Descartes was something of an exception to these trends with respect to mitigating what he took to be the unreliability of sense experience.

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²²Harrison, *Fall of Man*. As he sums it up,

[For many in the seventeenth century,] the birth of modern experimental science was not attended with a new awareness of the powers and capacities of human reason, but rather the opposite—a consciousness of the manifold deficiencies of the intellect, of the misery of the human condition, and of the limited scope of scientific achievement. (p. 258)

See also, Popkin, *The History of Skepticism from Erasmus to Spinoza*, and *The History of Skepticism: From Savonarola to Bayle*.

²³Joseph Spradley, "Methodological Naturalism in Ancient and Medieval Science," 66th Annual Meeting of the American Scientific Affiliation, July 28–August 1, 2011; "How Have Christian Faith and Natural Science Interacted in History?," in Dorothy F. Chappell and E. David Cook, eds., *Not Just Science: Questions Where Christian Faith and Natural Science Intersect* (Grand Rapids, MI: Zondervan, 2005), 27–47; Lindberg, *Beginnings of Western Science*.

²⁴Lindberg, *Beginnings of Western Science*, 240–1.

²⁵The idea that there was a scientific revolution has come in for a great deal of criticism of late. For example, see Andrew Cunningham and Perry Williams, "De-Centering the 'Big Picture': 'The Origins of Modern Science' and the Modern Origins of Science," *The British Journal for the History of Science* 26 (1993): 407–32. Although there is reason to be cautious in using such a grand term, I think it still has merit for delineating an important period in the history of the development of modern science.

²⁶For instance, see Robert Boyle, *A Free Enquiry into the Vulgarly Received Notion of Nature*, ed. Edward B. Davis and Michael Hunter (Cambridge: Cambridge University Press, 1996); Rose-Mary Sargent, *The Diffident Naturalist: Robert Boyle and the Philosophy of Experiment* (Chicago, IL: University of Chicago Press, 1995); Jan W. Wojcik, *Robert Boyle and the Limits of Reason* (Cambridge: Cambridge University Press, 1997).

²⁷Robert Boyle, *The Works of the Honorable Robert Boyle*, ed. T. Birch, vol. 5 (Hildesheim: Georg Olms, 1965 [1772]), 513–4, emphasis added.

²⁸Sargent, *Diffident Naturalist*, 110–2.

²⁹*Ibid.*, 112.

³⁰Boyle, *Works*, vol. 4, 7.

³¹*Ibid.*, *Works*, vol. 2, 19–20.

³²Sargent, *Diffident Naturalist*, 122.

³³*Ibid.*, 122.

³⁴Boyle, *Works*, vol. 4, 68, 78; and *Works*, vol. 5, 165.

³⁵*Ibid.*, *Works*, vol. 3, 7.

³⁶*Ibid.*, *Works*, vol. 2, 61. Understanding phenomena on their own terms also means understanding them in context: "A body is not to be considered barely in itself, but as it is placed in, and is a portion of the universe" (*Works*, vol. 3, 303). However, for Boyle, MN did not extend to the origin of matter, or living creatures; God created these immediately rather than mediating them through natural processes (Edward Davis, private communication).

³⁷Sargent, *Diffident Naturalist*, 115.

³⁸*Ibid.*, and Wojcik, *Robert Boyle*.

³⁹Howell, *God's Two Books*, chap. 3.

⁴⁰As quoted in *ibid.*, 120.

⁴¹*Ibid.*, chap. 4.

⁴²I. Bernard Cohen, *The Newtonian Revolution: With Illustrations of the Transformation of Scientific Ideas* (Cambridge: Cambridge University Press, 1980).

⁴³Isaac Newton, *The Correspondence of Isaac Newton*, vol. 3, ed. H. W. Turnbull (Cambridge: Cambridge University Press, 2008), 369; and Newton, *Opticks: or A Treatise of the Reflections, Refractions, Inflections & Colours of Light*, based on the 4th ed., ed. I. B. Cohen et al. (New York: Dover, 1979), 405. There is some ambiguity as to whether forces in Newton's view are physical or nonphysical—corporeal or non-corporeal, in his terms. See J. T. Dobbs, "Newton's Alchemy and His Theory of Matter," *Isis* 73 (1982): 511–28.

⁴⁴Isaac Newton, Keynes MS 3, fol. 12, King's College, Cambridge, <http://www.newtonproject.sussex.ac.uk/view/texts/normalized/THEM00003>; and Isaac Newton, Yahuda MS 15, fols. 47v, 96v, Jewish National and University Library, Jerusalem, <http://www.newtonproject.sussex.ac.uk/view/texts/normalized/THEM00220>.

⁴⁵Dobbs, "Newton's Alchemy," 526–8.

⁴⁶Isaac Newton, Keynes MS 6, fol. 1r, King's College, Cambridge, <http://www.newtonproject.sussex.ac.uk/view/texts/normalized/THEM00006>.

⁴⁷Newton, Letter of 25 February 1693, *Correspondence*, vol. 3, 254.

⁴⁸Gary B. Deason, "Reformation Theology and the Mechanistic Conception of Nature," in David C. Lindberg and Ronald N. Numbers, eds., *God and Nature: Historical Essays on the Encounter between Christianity and Science* (Berkeley: University of California Press, 1986), 167–91.

⁴⁹Gunton, *The Triune Creator*.

⁵⁰Dobbs, "Newton's Alchemy;" Davis, "Newton's Rejection of the 'Newtonian Worldview': The Role of Divine Will in Newton's Natural Philosophy," in Jitse M. van der Meer, ed., *Facets of Faith and Science, vol. 3: The Role of Beliefs in the Natural Sciences* (Lanham, MD: University Press of America, 1996), 75–96.

⁵¹Indeed, Newton believed that this was the normal pattern in religion from ancient times forward: Theology, philosophy, and astronomy were acknowledged to be distinct fields of study, yet interacted to produce true knowledge with theology as the broadest, encompassing the others. See Isaac Newton, Yahuda MS 41, fol. 4v, Jewish National and University Library, Jerusalem, <http://www.newtonproject.sussex.ac.uk/view/texts/normalized/THEM00077>. In that belief, he was surely right (Howell, *God's Two Books*).

⁵²Gunton, *The Triune Creator*; Bishop, "Recovering the Doctrine of Creation;" James Turner, *Without God, Without Creed: The Origins of Unbelief in America* (Baltimore, MD: The Johns Hopkins University Press, 1985); Margaret Jacob, "Christianity and the Newtonian Worldview," in Lindberg and Numbers, eds., *God and Nature*, 238–55.

⁵³Turner, *Without God*, chap. 2; Jacob, "Christianity and the Newtonian Worldview."

⁵⁴Turner, *Without God*, 40.

⁵⁵*Ibid.*; Jon H. Roberts, "Myth 18: That Darwin Destroyed Natural Theology," in Ronald L. Numbers, ed., *Galileo Goes to Jail and Other Myths about Science and Religion* (Cambridge, MA: Harvard University Press, 2009), 161–77. The argument from design appealing to the order and intelligibility of the world through laws did make a comeback in the second half of the nineteenth century.

⁵⁶Turner, *Without God*, 55–7, 77; Roger Hahn, “Laplace and the Mechanistic Universe,” in Lindberg and Numbers, eds., *God and Nature*, 264–71).

⁵⁷Turner, *Without God*.

⁵⁸*Ibid.*, 51.

⁵⁹*Ibid.*, 53.

⁶⁰*Ibid.*, fn. 53, 283, 77.

⁶¹*Ibid.*, 77.

⁶²*Ibid.*, 96.

⁶³*Ibid.*; Charles Taylor, *A Secular Age* (Cambridge, MA: Belknap Press, 2007).

⁶⁴Turner, *Without God*, 132–40. Although we tend to associate these three features of knowledge with science, Turner points out that in the nineteenth century,

Empirical rationality fitted rather well the developing environment of commercial capitalism. A penchant for rational organization helped to bring success in an increasingly complicated and interwoven tangle of economic relationships. A sharp eye on specific concrete realities aided in taking advantage of rapidly changing markets. (p. 132)

In other words, the developing model of knowledge found reinforcement as much in merchant and commercial values as in science.

⁶⁵*Ibid.*, chaps. 3–4 and 6.

⁶⁶Hence, Richard Dawkins’s oft-repeated claim that Darwin made it possible to be an intellectually fulfilled atheist is historically inaccurate to say the least.

⁶⁷Turner, *Without God*, 171.

⁶⁸Design arguments based on the overall order of nature were less disturbed (Roberts, “Myth 18: That Darwin Destroyed Natural Theology”).

⁶⁹Turner, *Without God*, 180.

⁷⁰Ronald L. Numbers, “Science without God: Natural Laws and Christian Beliefs,” in Lindberg and Numbers, eds., *When Science and Christianity Meet* (Chicago, IL: University of Chicago Press, 2008), 277–9.

⁷¹George F. Wright, *Studies in Science and Religion* (Andover, MA: Warren F. Draper, 1882). Kepler said something very similar in 1606 in reference to explaining the origin of a newly discovered star: “However, we should consider all [other possibilities] before that of [special] creation as that is to end all discussion,” *De Stella Nova*, chap. 22 in Johannes Kepler, *Gesammelte Werke*, vol. 1, ed. Walther von Dyck and Max Caspar (Munich: C. H. Beck’sche Verlagsbuchhandlung, 1938), 257 (my translation).

⁷²Turner, *Without God*, 175–87; Numbers, “Science without God,” 279–81; Matthew Stanley, “The Uniformity of Natural Laws in Victorian Britain: Naturalism, Theism, and Scientific Practice,” *Zygon* 46, no. 3 (2011): 537–60. Stanley points out Huxley’s clever relabeling of theistic scientists’ statements of MN as metaphysically naturalistic.

⁷³Turner, *Without God*, 189–202; Numbers, “Science without God,” 281–2; Timothy Larsen, *Crisis of Doubt: Honest Faith in Nineteenth-Century England* (Oxford: Oxford University Press, 2009).

⁷⁴Ian Hutchinson, *Monopolizing Knowledge: A Scientist Refutes Religion-Denying, Reason-Destroying Scientism* (Belmont, MA: Fias Publishing, 2011).

⁷⁵Robert G. Ingersoll, *The Works of Robert G. Ingersoll*, vol. 1, ed. R. Green (New York: Dresden Publishing, 1909), 192.

⁷⁶*Ibid.*, 27.

⁷⁷This false dilemma is still pervasive in the science-religion literature.

⁷⁸Turner, *Without God*, 180–2. The quotation is from pp. 181–2.

⁷⁹*Ibid.*, 184–6, emphasis added.

⁸⁰Cunningham and Williams, “De-Centering the ‘Big Picture,’” make the argument that modern science, in a substantial sense, began with this secularizing of science in addition to replacing the term “natural philosophy” with “science” as we now understand the latter term.

⁸¹Nor is the rise of metaphysical naturalism explainable apart from a host of moral commitments and ethical ideals (e.g., *ibid.*, especially chap. 7; Taylor, *Secular Age*).

⁸²There are parallels in biblical interpretation from the Reformation. For instance, Luther recognized that the Moon’s light, say, could be described as a sign of divine providence, while at the same time it was described by astronomers as a reflection of the Sun’s light. Similarly, Calvin taught that Moses and other biblical authors described heavenly phenomena as they appeared to observers in their day, while astronomers would give technical descriptions for purposes that differed from those of Moses.

As Gary Deason summarizes in “Reformation Theology,”

Recognizing the accommodation of the text to the general reader, the interpreter could avoid conflict with contemporary astronomy by claiming that the biblical author described the heavens as they appeared to the unlearned eye, not as they might be understood by the astronomer. (p. 171)

The astronomers’ descriptions are analogous to MN in that they did not replace religious descriptions, but served different purposes from the latter (cf. Howell, *God’s Two Books*; Harrison, *Fall of Man*).

⁸³Brad S. Gregory, “No Room for God? History, Science, Metaphysics, and the Study of Religion,” *History and Theory* 47 (2008): 495–519 (emphasis added).

⁸⁴Bruce Gordon, “In Defense of Methodological Neutrality” (emphasis added). Alvin Plantinga has a subtle example of this in *Where the Conflict Really Lies: Science, Religion, and Naturalism* (New York: Oxford University Press, 2011). He characterizes MN as “a proposed condition or constraint on proper science, or the proper practice of science, not a statement about the nature of the world” (p. 169). He then strengthens this characterization: “More generally, the idea is that in science we should proceed *as if* the supernatural is not given” (p. 170, emphasis added). More importantly, he elaborates MN as “a constraint on the evidence base of any scientific inquiry” (p. 172). The real problems begin when Plantinga states that “the evidence base of a Christian theist will include (among much else) belief in God” but MN rules out such evidence (p. 173). MN now is confused with metaphysical naturalism because the latter explicitly rules God out, but MN on Plantinga’s construal now rules God out. However, beliefs are not evidence for scientists. Plantinga has introduced a philosophical notion of evidence into a discussion of scientific evidence and methodology, and has thereby created a confusion that does not properly exist in scientific methodology itself.

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