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Science and Natural Theology: Barriers to Dialogue

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Revised Paper Abstract:

Natural theology is the part of metaphysics that studies God by using reason and our knowledge of the natural world. Natural theologians attempt to obtain knowledge of God by arguing from effect to cause. In this regard the contemporary sciences have an important role to play. For example, recent discoveries in cosmology and physics, which seem to imply that the universe was "fine-tuned" for life, have reawakened debate about the design argument for the existence of God. Natural theologians have an important role to play in this debate because they are the mediators between science and religion. Unfortunately, contemporary dialogue between science and religion has deteriorated to such an extent that, at times, both sides appear to be at war with one another. In an effort to improve dialogue and advance the discussion, I do three things in this paper. First, I discuss the primary barriers to dialogue between scientists and natural theologians. Second, I propose an expanded conception of science that will strengthen science and provide a neutral metaphysical framework for scientists to conduct their investigations. This neutral framework should be acceptable to both atheists and theists. Third, I argue that scientists cannot escape metaphysics and thus they should engage in interdisciplinary work with metaphysicians. Taken together, my proposals should also help to alleviate at least some of the problems currently hindering dialogue between science and religion.

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Robert A. Delfino is an assistant professor of philosophy at St. John's University in New York City. He received his Ph.D. from the State University of New York at Buffalo, where he specialized in metaphysics and medieval philosophy, studying under Jorge J. E. Gracia and Barry Smith. His current research interests include metaphysics, natural theology, the relationship between science and metaphysics, philosophy of science, philosophy of religion, and ethics. He has published articles on Aristotle, medieval philosophy, metaphysics, philosophy of science, human rights, and aesthetics, and he has edited three books: *Plato's Cratylus: Argument, Form, and Structure* (2005), *Understanding Moral Weakness* (2006), and *What are We to Understand Gracia to Mean?: Realist Challenges to Metaphysical Neutralism* (2006). He is the editor of *Studies in the History of Western Philosophy (SHWP)*, a special series within the *Value Inquiry Book Series (VIBS)*, and he maintains the official webpage of the American Maritain Association.

## SCIENCE AND NATURAL THEOLOGY: BARRIERS TO DIALOGUE

Robert A. Delfino

The Western culture as we know it today is largely a product of the historical convergence of science and religion. With respect to science, we can trace its birth back to the ancient Greek philosophers, where we find the first systematic attempt to use observation and reason to discover the causes of things. With respect to religion, Christianity, although once a small and persecuted sect of Judaism, eventually became the official religion of the Roman Empire. This allowed the Christian Gospel of Love of God and neighbor to have a great influence on the politics and culture of Europe.

In the Middle Ages, this convergence reached its height in Thomas Aquinas, who, in addition to arguing that there was no conflict between science and religion, argued that humans were capable of proving some things about God by using reason and our knowledge of the natural world.<sup>1</sup> Aquinas explicitly distinguished this natural type of theology from revealed theology, which, in contrast, relied on principles that were communicated to us by God and recorded in the Sacred Scriptures.<sup>2</sup> For Aquinas, natural theology was a part of metaphysics. The primary subject of metaphysics was not God, but being *qua* being. God was studied in metaphysics, but only to the extent that God was understood to be the cause of the existence of things.<sup>3</sup>

Because natural theology is part of metaphysics, the historical standing of both has been linked. Although Aristotle and Aquinas considered metaphysics to be the highest of the theoretical sciences, which included physics and mathematics, this is no longer the consensus among contemporary scientists. Since the Middle Ages, a series of attacks on metaphysics, accompanied by changing conceptions of science, has led to the separation of metaphysics and science and thus to greater isolation between science and religion.<sup>4</sup>

Recently, the situation has grown worse. Dialogue between science and religion has deteriorated to such an extent that, at times, both sides appear to be at war with one another.<sup>5</sup> In the United Kingdom, for example, evolutionary biologist Richard Dawkins has mounted a full-scale attack on God and religion in his book *The God Delusion*.<sup>6</sup> In the United States, Sam Harris, who is studying to be a neuroscientist, has written an article called "Science Must Destroy Religion."<sup>7</sup> While the majority of scientists have not taken this stance, Dawkins and Harris are part of a growing chorus of scientists and philosophers who are increasingly vocal about their hostility to God and religion.<sup>8</sup>

In an effort to improve dialogue and advance the discussion, I do three things in this paper. First, I discuss the primary barriers to dialogue between scientists and natural theologians. Second, I propose an expanded conception of science that will strengthen science and provide a neutral metaphysical framework for scientists to conduct their investigations. This neutral framework should be acceptable to both atheists and theists. Third, I argue that scientists cannot escape metaphysics and thus they should engage in interdisciplinary work with metaphysicians. Taken together, my proposals should also help to alleviate at least some of the problems currently hindering dialogue between science and religion.

## I. Barriers to Dialogue

Whether or not there can be any dialogue between science and natural theology hinges on the following question: Is science capable, at least in principle, of telling us anything about God? If the answer is “no” then, of course, dialogue will not be possible. If the answer is “yes,” then dialogue, at least to some extent, will be possible. However, even if the answer is “yes,” science will not be able to speak about God in the detailed way that God is discussed in the Sacred Scriptures. Revelation is not allowed in science. Thus whatever science could say about God would still be quite limited.<sup>9</sup> For example, perhaps science could conclude to the existence of an intelligent cause that transcends the universe.

With respect to the question I mentioned above, it must be stated that the majority of scientists do not think that science can say anything about God. One reason for this is that God, conceived of as transcendent, would be supernatural, or, in other words, outside of nature. However, most scientists hold that science only investigates the natural world. Indeed, the distinguished United States National Academy of Sciences has stated that “Science is a way of knowing about the natural world. It is limited to explaining the natural world through natural causes. Science can say nothing about the supernatural.”<sup>10</sup>

The prohibition against the supernatural in science is usually formulated as a guiding principle known as methodological naturalism and it constitutes one of the primary barriers to dialogue between scientists and natural theologians. As such, it warrants closer consideration.

### A. Methodological Naturalism

It is important to distinguish methodological naturalism from metaphysical naturalism. Metaphysical naturalism is a view that denies the existence of supernatural entities. Usually this view amounts to a kind of materialism and therefore it denies the existence of non-material beings such as God. If science assumed metaphysical naturalism it would be taking a metaphysical stance on God, namely, the stance of atheism. However, most scientists and philosophers of science recognize that the assumption of such a principle is unwarranted and unscientific and therefore they reject the view that science assumes metaphysical naturalism.<sup>11</sup>

In contrast, methodological naturalism is an epistemological principle that governs how science is practiced. It limits scientists to natural explanations. However, unlike metaphysical naturalism, it does not make any claims about the existence or non-existence of supernatural entities. Michael Ruse, a philosopher of science, explains: “[I]n no sense is the methodological naturalist ... committed to the denial of God’s existence. It is simply that the methodological naturalist insists that, in as much as one is doing science, one avoid all theological or other religious references.”<sup>12</sup>

As I have argued elsewhere, there are some important implications for science if scientists choose to adopt the principle of methodological naturalism.<sup>13</sup> One implication is that they should be consistent and reprimand scientists, such as Dawkins, who attack God and religion in the name of science. After all, if science excludes the supernatural from its object of study and its

use in explanations then science cannot say anything about the supernatural. Some scientists, such as Eugenie Scott, an anthropologist who works for the United States National Center for Science Education, have recognized this.<sup>14</sup>

A second implication of adopting methodological naturalism is that science would no longer be understood as a kind of realism. Realism, roughly speaking, is the view that science aims at discovering objective truths about reality, where reality is understood as that which exists independently of our minds. Realism in one form or another has been the dominant view of science for most of history and it is currently the dominant view among philosophers of science.<sup>15</sup> What is essential to realism is that our theories must conform to reality in order to be true. If we gather evidence that conflicts with a theory we must modify or abandon that theory. This is the principle of self-correction. But methodological naturalism potentially jeopardizes this principle as Del Ratzsch, a philosopher of science, explains: “[I]f part of reality lies beyond the natural realm, then science cannot get at the truth without abandoning the naturalism it presently follows as a methodological rule of thumb.”<sup>16</sup>

Even though methodological naturalism is not the same as metaphysical naturalism, it still adds a type of metaphysical bias to science. This is because methodological naturalism limits the metaphysical categories one can use in scientific explanations. For example, Scott calls the principle methodological materialism and says it “requires that scientific explanations use only material (matter, energy, and their interaction) cause[s].”<sup>17</sup> But what if the human mind, for example, is non-material? Then scientists will not be able to get at the truth. Realists want to study the actual world, whatever it contains, but methodological naturalism limits science to the natural world and to natural causes.

Rather than impose on science some pre-conceived understanding of natural or non-natural, I have argued that scientists should consider a different guiding principle, which I call methodological neutralism.<sup>18</sup> The principle of methodological neutralism states that scientists should simply search for causes without setting any *a priori* conditions on what ontological status those causes must have. Once evidence is gathered scientists can lean in favor of a cause being natural or supernatural as the evidence indicates. However, even this is only tentative as new discoveries might cause scientists to change their view about a particular cause’s ontological status.

Methodological neutralism does not put an *a priori* limitation on the metaphysical categories scientists can use. Instead, it is the evidence gathered that leads scientists to their conclusions and, if necessary, the positing of new metaphysical categories. For this reason methodological neutralism is preferable to methodological naturalism when science is understood as a kind of realism. Another advantage of methodological neutralism is that it helps to build a neutral metaphysical framework that is compatible with both materialism and non-materialism. For example, it might be the case that scientists never discover anything that would lead them to posit non-material categories. Then again, they might discover something that cannot be adequately explained by purely material categories. For example, cosmologists might conclude that a cause of the big bang would have to be non-material and outside of time. This last example raises the topic of ultimate causation, which is the next barrier to dialogue that I would like to explore.

## B. Ultimate Causation

As science probes deeper and deeper into the universe it seems to reach a point where it can no longer ignore the idea of an ultimate cause and, therefore, can no longer ignore metaphysics.<sup>19</sup> For example, some recent discoveries in cosmology and physics, which seem to imply that the universe was “fine-tuned” for life, have reawakened debate about the design argument for the existence of God. Let us examine this issue more closely.

Over the last thirty years or so, physicists and cosmologists have noted that the laws of the universe appear to be designed for life. As physicist Paul Davies, in his book *Cosmic Jackpot: Why Our Universe is Just Right for Life*, puts it: “The existence of life as we know it depends delicately on many seemingly fortuitous features of the laws of physics and the structure of the universe.”<sup>20</sup> Although some cases offered as evidence for fine-tuning seem to be problematic, there are strong cases, including: (1) the cosmological constant, (2) the strong and electromagnetic forces, (3) carbon production in stars, (4) the proton/neutron mass difference, (5) the weak force, and (6) gravity.<sup>21</sup> Make small changes to any of the items just mentioned and life in the universe would not be possible.

This discovery has prompted some scientists to consider the view that life is not an accident. For example, physicist Freeman J. Dyson has remarked: “The more I examine the universe and study the details of its architecture, the more evidence I find that the universe in some sense must have known that we were coming.”<sup>22</sup> Davies is so impressed that he thinks the data “points forcefully to a deeper underlying meaning to existence. Some call it purpose, some design.”<sup>23</sup>

In his search to answer why the universe seems so bio-friendly, Davies is willing to expand the traditional notion of science and consider ultimate causes. Towards the end of *Cosmic Jackpot*, he considers several ultimate explanations, including the multiverse, God, and the life principle, to name just a few. He also tells us that the life principle is one of the explanations towards which he feels inclined. As such, I think it merits our attention.

According to Davies’s *life principle theory*, “[T]he bio-friendliness of the universe arises from an overarching law or principle that constrains the universe ... to evolve toward life and mind.”<sup>24</sup> There are some important things to note about this theory. First, although he is clear that the life principle is not a mind, Davies is offering a type of teleological explanation, and by doing so he is expanding the contemporary notion of science. He acknowledges this and says that this “represents a decisive break with traditional scientific thinking, in which goal-oriented or directional evolution is eschewed as antiscientific.”<sup>25</sup>

Second, Davies’s discussion of a life principle highlights a particular case where scientists cannot escape metaphysics. Discussion of a life principle raises the following question: When things act for a purpose is a mind always required, at least somewhere, in the causal account? It does not matter if a scientist answers “yes” or “no” to this question. Either position commits the scientist to a metaphysical position. This is because the answer to this question must be decided, if it can be decided at all, in metaphysics since it cannot be decided empirically or logically.

The more general point that cosmology will remain incomplete if it refuses to engage in interdisciplinary work with metaphysicians, has been made by philosopher of science Nancey Murphy and mathematician George F. R. Ellis:

In the rest of science we can take the existence both of the universe and of the laws of nature for granted, and, while we spend a great deal of time and energy in determining the nature of these laws, we do not have to consider why they have the form they do. Cosmology, however, in the end calls for an explanation of these issues: 1. Why is there a universe at all? 2. Why are there any regularities in nature at all (enabling us to comprehend it in terms of physical laws)? [and] 3. Why do those regularities and physical laws take the particular form they do? [The question of fine-tuning is included in this last question.]<sup>26</sup>

Note that the study of existence has traditionally been the province of metaphysics. As I mentioned earlier, Aquinas held that the primary subject of metaphysics was being *qua* being. However, Murphy and Ellis are correct to say that without an answer to some existential questions cosmology will remain incomplete.

As it turns out, questions about existence have proved too tempting for scientists to ignore. For example, Heinz R. Pagels, a physicist, is one of several scientists to discuss quantum vacuum fluctuations as a way to explain the coming into existence of the entire universe: “Maybe the universe itself sprang into existence out of nothingness—a gigantic vacuum fluctuation which we know today as the big bang. Remarkably, the laws of modern physics allow for this possibility.”<sup>27</sup>

In the above excerpt, Pagels is making a claim about ultimate causation and existence. As such, he is engaging in metaphysics whether or not he realizes it. As an aside, I think he is guilty of bad metaphysics here. To say that the universe can spring into being from nothing is equivalent to saying that it can spring into being without a cause. But science is about cause and effect relationships. Thus, to hold that the universe can come into being without a cause undermines the discipline of science itself.

At this point it might be objected that even though science occasionally brushes up against metaphysics the two disciplines are clearly distinct. In fact, one of the reasons given for why science cannot treat metaphysical questions is because metaphysical questions, such as the three questions posed by Murphy and Ellis above, are not testable. Indeed, the question of whether or not scientists can say anything about God hinges on the question of testability, which is the next barrier I would like to discuss.

### C. Testability

It is true that some metaphysical questions cannot be tested scientifically. However, I do think that some proposed hypotheses in metaphysics are testable by science—not in the sense of conducting physical experiments—but by using the hypothetico-deductive method. Murphy and Ellis made this very point concerning the questions they raised above.<sup>28</sup> They have argued that:

[T]he relation between fine-tuning and the theory of design is hypothetico-deductive: *if* there is a designer, this fact explains the fine-tuning and is thereby confirmed. More specifically, our claim is that, given a theological research program that includes the theory that the universe was created (designed) by a God whose aim was personal relations with sentient beings, the fine-tuning of the universe can be seen to provide *novel* confirmation, in Imre Lakatos's terms.<sup>29</sup>

In this case the God hypothesis is justified to the extent that we have reasoned to the best available explanation, which, of course, is subject to future revision. Interestingly, physicist and atheist Victor J. Stenger does not seem to have a problem with this approach to testing for God, although he thinks that science has shown that God does not exist.<sup>30</sup> I do not have enough space here to describe the research program of Murphy and Ellis in the detail it deserves, but I think it offers a good model for interdisciplinary work between cosmologists and metaphysicians.<sup>31</sup>

Nevertheless, I should point out that some scientists disagree with my assessment. For example, chemist Peter W. Atkins thinks that scientists have no need for metaphysics. In a debate last year with theologian Alister E. McGrath, Atkins said: "Science ... is, after all, the only true way of knowing anything. ... There are no limits to science ... I see nothing that ... the scientific method is incapable of touching."<sup>32</sup> This view sounds very close to *scientism*, the view that we can have no knowledge apart from science. It also represents another barrier to dialogue, which I hope to dispel by showing that metaphysics is inescapable. Let us examine this matter more closely.

#### D. Scientism

In opposition to Atkins, let me point out that scientism is mistaken because science itself presupposes some knowledge that cannot be arrived at by using the scientific method. Take, for example, the law of non-contradiction. Even though it is often thought of as a logical principle, Aristotle gives a metaphysical formulation of it: "[I]t is impossible for anything at the same time to be and not to be."<sup>33</sup> He also makes the point that not everything can be demonstrated otherwise there would be an infinite regress, which would make the demonstration of anything impossible.<sup>34</sup> The corollary for science is that not everything can be known through the scientific method.

In addition to recognizing this, some scientists have also recognized that science requires a philosophical framework. For example, physicist Sunny Y. Auyang admits that, without philosophy, the conceptual structures of science are incomplete:

Although our chief concerns are quantum fields and elementary particles, we cannot forget that the paradigms of objects are the things we handle everyday, such as tables and chairs, which provide an anchor to the meaning of "object" and "real" ... The crux of the philosophical problem lies in the relation between our theories and the world. The relation is articulated and grasped in ordinary language; interpreters must connect the structures of physical theories to general common concepts such as that of objects and properties. Common notions are vague, which implies that they need to be clarified, not that they can be slighted. This clarification is the job of philosophy.<sup>35</sup>

According to philosopher Jorge J. E. Gracia, the clarification of these notions belongs to metaphysics. For Gracia, metaphysics is the study of categories and it has several tasks.<sup>36</sup> With respect to the most general categories, metaphysics aims to identify the most general categories, to define them if possible, and to determine the relationships among these categories. With respect to the less general categories, metaphysics aims to fit them correctly into the most general categories, and to determine how they are related to all the most general categories, including categories into which they do not fit.

One virtue of Gracia's view is his neutral understanding of category itself.<sup>37</sup> By understanding category in a neutral way, Gracia avoids reducing all categories to words, or concepts, or extra-mental entities. As he puts it: "Each category is what it is, as expressed by its definition, and therefore cannot be reduced to any other category unless the conditions that it satisfies make such reduction legitimate."<sup>38</sup> This allows metaphysics to cover a wide range of objects, and, therefore, to provide the categorial foundation of all knowledge, including the sciences:

Metaphysics, then, turns out to be the categorial foundation of knowledge. For in it we attempt to establish and understand the most general categories and the relation of all other categories to them. ... As the view of these categories and their relations, metaphysics is *logically presupposed* by every other view that one may have. Any account of what we know or think we know, then, is incomplete until we provide its metaphysical foundation. We can, of course, practice other disciplines and hold other views without consciously practicing metaphysics or holding metaphysical views, but in these cases we do in fact vicariously engage in metaphysics and hold metaphysical views, for the views we hold logically presuppose views about the most general categories, their interrelations, and the relation of the less general categories we use to the most general categories. All our knowledge depends on metaphysical views whether we are aware of it or not, and all our thinking involves metaphysical thinking. Those who delude themselves in believing that they do not engage in metaphysical thinking nonetheless do. The only difference between them and declared metaphysicians is that the former are unaware of what they do and, therefore, do it surreptitiously and unreflectively, whereas the latter are aware of it and do it openly and deliberately. Metaphysics is inescapable.<sup>39</sup>

By now it should be clear that no scientist can escape metaphysics. To believe otherwise is a delusion. Instead, scientists should realize that they need metaphysics and that there is much to be gained by engaging in interdisciplinary work with metaphysicians.

## **II. Summary of My Proposal**

By embracing methodological neutralism and engaging in interdisciplinary work with metaphysicians science will be strengthened in several ways. First, there will be a neutral metaphysical framework, one that does not presuppose materialism or non-materialism, for scientists to conduct their investigations. Such a framework strengthens science because it allows scientists to follow the evidence wherever it leads and this is in harmony with a realistic conception of science. Second, metaphysics will help to secure the foundation of science and to complete its conceptual structures. Third, interdisciplinary work between scientists and

metaphysicians should also help to alleviate at least some of the problems currently hindering dialogue between science and religion.<sup>40</sup>

## NOTES

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<sup>1</sup> See, for example, Thomas Aquinas, *Summa theologiae*, I, q. 2; and the first three parts of the *Summa contra Gentiles*.

<sup>2</sup> Thomas Aquinas, *Expositio super Librum Boethii de Trinitate*, q. 2, a. 2, resp., trans. Armand A. Maurer, *Faith, Reason and Theology* (Toronto: Pontifical Institute of Medieval Studies, 1987), pp. 41-42.

<sup>3</sup> *Ibid.*, q. 5, a. 4, resp., trans. Armand A. Maurer, *The Division and Methods of the Sciences* (Toronto: Pontifical Institute of Medieval Studies, 4th ed., 1986), pp. 49-51.

<sup>4</sup> See Jorge J. E. Gracia, *Metaphysics and its Task: The Search for the Categorical Foundation of Knowledge* (Albany, N.Y.: State University of New York Press, 1999), pp. ix-xiii, and W. Norris Clarke, S.J., “Is Natural Theology Still Viable Today?” *Explorations in Metaphysics: Being—God—Person* (Indiana: University of Notre Dame Press, 1994), pp. 150-182.

<sup>5</sup> For a brief overview, see Alister E. McGrath, *The Foundations of Dialogue in Science & Religion* (Oxford: Blackwell, 1998), pp. 20-28.

<sup>6</sup> Richard Dawkins, *The God Delusion* (New York: Houghton Mifflin Company, 2006).

<sup>7</sup> Sam Harris, “Science Must Destroy Religion,” *The Huffington Post*, January 2, 2006, available online here: [http://www.huffingtonpost.com/sam-harris/science-must-destroy-reli\\_b\\_13153.html](http://www.huffingtonpost.com/sam-harris/science-must-destroy-reli_b_13153.html)

<sup>8</sup> See John F. Haught, *God and the New Atheism: A Critical Response to Dawkins, Harris, and Hitchens* (London: Westminster John Knox Press, 2008).

<sup>9</sup> Even the knowledge of God furnished by natural theology is quite limited. For example, although Aquinas holds that we can prove some things about God using philosophy, the predicates involved are only predicated analogously (see *Summa theologiae*, I, q. 13). Our knowledge of God, then, is very weak because God transcends the understanding we have of Him: “It is because human intelligence is not equal to the divine essence that this same divine essence surpasses our intelligence and is unknown to us: wherefore man reaches the highest point of his knowledge about God when he knows that he knows him not, inasmuch as he knows that that which is God transcends whatsoever he conceives of him.” *Quaestiones Disputatae de Potentia Dei*, q. 7, a. 5, ad 14, trans. by the English Dominican Fathers, *On the Power of God* (Eugene, Oregon: Wipf and Stock Publishers, 2004), third book, p. 33. See also W. Norris Clarke, S.J., *The Philosophical Approach to God: A New Thomistic Perspective* (New York: Fordham University Press, 2nd ed., 2007), pp. 69-90.

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<sup>10</sup> National Academy of Sciences, *Teaching About Evolution and the Nature of Science* (Washington, D.C.: National Academies Press, 1998), p. 58.

<sup>11</sup> See, for example, Robert T. Pennock, *The Tower of Babel: The Evidence against the New Creationism* (Cambridge, Massachusetts: The MIT Press, 1999), pp. 189-194.

<sup>12</sup> Michael Ruse, "Methodological Naturalism under Attack," *Intelligent Design Creationism and Its Critics: Philosophical, Theological, and Scientific Perspectives*, ed. Robert T. Pennock (Cambridge, Massachusetts: MIT Press, 2001), p. 365.

<sup>13</sup> Robert A. Delfino, "Replacing Methodological Naturalism" *Global Spiral* (May 2007), available here: <http://www.metanexus.net/Magazine/tabid/68/id/10028/Default.aspx>

<sup>14</sup> "If science is limited to explaining the natural world using natural causes, and thus cannot admit supernatural explanations, so also is science self-limited in another way: it is unable to reject the possibility of the supernatural." Eugenie C. Scott, "Creationism, Ideology, and Science," *The Flight From Reason and Science* (New York: New York Academy of Sciences, 1996), p. 519.

<sup>15</sup> Frederick Suppe, *The Structure of Scientific Theories* (Urbana: University of Illinois Press, 2nd ed., 1977), pp. 652, 716-728.

<sup>16</sup> Del Ratzsch, *Science & Its Limits: The Natural Sciences in Christian Perspective* (Downers Grove, Illinois: InterVarsity Press, 2000), p. 105.

<sup>17</sup> Eugenie C. Scott, *Evolution vs. Creationism: An Introduction* (Berkeley, California: University of California Press, 2004), p. 50.

<sup>18</sup> Delfino, "Replacing Methodological Naturalism"

<sup>19</sup> Aristotle, for example, is clear that metaphysics investigates ultimate causes and principles. See *Metaphysics*, 981b27, 982b10, and 1003a27.

<sup>20</sup> Paul Davies, *Cosmic Jackpot: Why Our Universe Is Just Right for Life* (New York: Houghton Mifflin Company, 2007), p. 150. All references are to the United States version of this book. In Europe this book bears the following title: *The Goldilocks Enigma: Why Is the Universe Just Right for Life?*

<sup>21</sup> Robin Collins, "Evidence for Fine-Tuning," *God and Design: The Teleological Argument and Modern Science*, ed. Neil A. Manson (New York: Routledge, 2003), pp. 178-199.

<sup>22</sup> Freeman J. Dyson, *Disturbing the Universe* (New York: Basic Books, 1979), p. 250.

<sup>23</sup> Paul Davies, "The Appearance of Design in Physics and Cosmology," *God and Design: The Teleological Argument and Modern Science*, ed. Neil A. Manson (New York: Routledge, 2003), p. 152.

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<sup>24</sup> Davies, *Cosmic Jackpot*, p. 266.

<sup>25</sup> *Ibid.*

<sup>26</sup> Nancey Murphy and George F. R. Ellis, *On the Moral Nature of the Universe: Theology, Cosmology, and Ethics* (Minneapolis: Augsburg Fortress Press, 1996), pp. 60-61.

<sup>27</sup> Heinz R. Pagels, *The Cosmic Code: Quantum Physics as the Language of Nature* (New York: Bantam Books, 1982), p. 247.

<sup>28</sup> Murphy and Ellis, *On the Moral Nature of the Universe*, p. 61.

<sup>29</sup> *Ibid.*, p. 63.

<sup>30</sup> Victor J. Stenger, *God: The Failed Hypothesis: How Science Shows That God Does Not Exist* (Amherst, New York: Prometheus Books, 2007).

<sup>31</sup> In addition to *On the Moral Nature of the Universe*, see George F. R. Ellis, “The Theology of the Anthropic Principle” and Nancey Murphy “Evidence of Design in the Fine-Tuning of the Universe” *Quantum Cosmology and the Laws of Nature: Scientific Perspectives on Divine Action* (Jointly published by the Vatican Observatory and The Center for Theology and the Natural Sciences, 2nd ed., 1996), pp. 363-399 and 401-428.

<sup>32</sup> This occurred in 2007 in a public debate called “Darwin and humanity: Should we rid the mind of God?,” held at the University of Edinburgh. It is available online here: <http://atheistdebate.org/>. The first part of Atkins’s remarks occurs about thirty-seven minutes into the debate. The second part of his remarks occurs about four and a half minutes later. He also makes similar statements later on in the debate.

<sup>33</sup> Aristotle, *Metaphysics*, 1006a2-3, trans. W. D. Ross, *The Basic Works of Aristotle*, ed. Richard McKeon (New York: Random House, 1941), p. 737.

<sup>34</sup> *Ibid.*, 1006a4-10.

<sup>35</sup> Sunny Auyang, *How is Quantum Field Mechanics Possible?* (Oxford: Oxford University Press, 1995), pp. 11-12.

<sup>36</sup> Gracia, *Metaphysics and its Task*, pp. 131-158.

<sup>37</sup> *Ibid.*, pp. 205-208.

<sup>38</sup> *Ibid.*, p. 220.

<sup>39</sup> *Ibid.*, pp. 220-221.

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<sup>40</sup> I would like to thank Arthur F. Gianelli for helpful comments on this paper. I also benefited from discussions with Jorge J. E. Gracia, Marie I. George, and David S. Shear. *Et Deo Gratias.*