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Teadus ja elu. Sisu ja siht.
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PETER PAYNE

PhD filosoofias, Institute for Credible Christianity tegevjuht. Ta on 21 aastat töötanud Rahvusvahelises Evangeelsete Üliõpilaste Ühenduses (IFES) Stanfordi ja Michigani Ülikooli juures.

Teadus ja kristlus: kas maailmavaated konfliktis?

Kas teadus ja kristlus on omavahel konfliktis? Kas pilt maailmast, mida meile esitab teadus, on konfliktis Piiblis ja ajaloolises kristlikus usutunnistuses esitatud pildiga? Tihtipeale, kui sellised küsimused esitatakse, mõtlevad inimesed dispuudile evolutsiooniteooria üle. Käesolevaga tahan käsitleda palju laiemat ja põhimõttelisemat teemat, milleks on küsimus: kas teaduse edusammud ja see, mis edust tuleneb, vastandub kristlikule maailmavaatele?



KORRALDAJAD:



Science and Christianity: Worldviews in Conflict? Apologetics Note #3

Are science and Christianity in conflict with one another? Put another way, does the picture of the world that science presents to us conflict with the picture of the world presented in the Bible and reflected in the historic confessions of the Christian faith? Often when such a question is raised, people think of the dispute over the theory of evolution. The topic does indeed raise significant questions, but here I will only make a few comments about that. This essay is concerned with a broader and more fundamental issue; namely, whether the success of the sciences, and what may be inferred from that success, conflicts with a Christian worldview.¹

The Conflict

Why suppose that there is any conflict? The argument can be summarized as follows. Wherever we look in the world around us, whether at the sub-atomic level or at the level of the cosmos, we find an order that can be described in terms of natural laws. Using the laws of nature and knowledge of the prior physical states of the entities or system in question, we are able to predict, or at least account for, the event or fact that we are seeking to explain.² There is, of course, much that we yet do not understand, but even phenomena that at one time were thought to be beyond our ability ever to comprehend, are coming to be understood as functioning in accordance with natural law. For example, although there is much about ourselves that cannot yet be accounted for in this way, especially when it comes to consciousness and human thought, nonetheless we know that human perception, thought, and feeling is at least closely connected with neural events in the brain. And brain events, like events elsewhere in the physical world, are yielding to scientific explanation.³ Next, it is significant to note that such explanations do not make any reference to God. Explanation consists solely in coupling prior states of affairs with the natural laws in order to account for what occurs. Now, those who see science and Christianity as being in conflict will argue that whereas in the past people thought of many things as being made to happen by the will of God, we now know that things happen for natural causes. What's more, they argue, the successes of science should lead one to the conclusion that at no point is anything caused by God or by anything supernatural. Indeed, they contend that belief in God and in the supernatural was simply a product of ignorance. The light of science has dispelled the idea of God, or at least dispelled the idea of a God who cares for and interacts with his creation. Science, they say, has left no room for divine activity in the world.

Before responding to this line of reasoning, it would be good to reflect a bit more on the nature of the supposed conflict. An interesting way to characterize it comes from game theory. Game theory seeks to describe in mathematical terms optimal strategies for winning at various sorts of games.⁴ In game theory a "zero-sum game" is one in which a gain for one player entails a loss for the others (hence gains and losses sum to zero). Suppose, for instance, you and I are playing cards and the goal is to win as many tricks as possible.⁵ Whenever I win a trick, it is my gain and your loss, and vice versa.

Thinking of the relationship of science to Christianity in zero-sum terms would entail that any gain for science would imply a loss for Christianity and vice versa. Now, clearly, not every advance of science is a threat (or loss) for the Christian faith. Christians are comfortable with the idea that God allows many things to happen in accordance with

¹ For those not familiar with the concept of worldview, it hinges on the idea that there are some fundamentally different ways in which a person may view such topics as the meaning and purpose of life and the nature of reality, the physical world, human nature, and the human condition. Whether God and other nonmaterial beings exist and what our relation to him or them is, of course, are important part of one's worldview. One's views on such questions tend to cohere into an overall outlook on the world and on life that frame up how one sees everything else. The focus in this essay is on the nature of the physical world and God's relationship to it.

² Perfect prediction is often not possible for a couple reasons. One relates to chaos theory. Many systems are so structured that no matter how accurately we try to measure the state of a system at a given moment, even the slightest inaccuracies quickly compound so as to render prediction of future states impossible. Another is that contemporary physics is at root probabilistic stating a range of probabilities for possible outcomes. At the quantum level we are only able to state probabilities about what will happen.

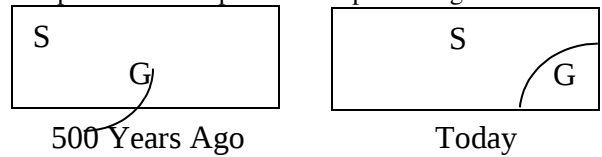
³ Whether "scientific explanation" is limited to explanation in terms of prior physical states and laws of nature is a topic of debate, but it is this kind of explanation that is in view here.

⁴ The point is not to teach people how to win at well-known games such as chess or poker; rather it is to understand in abstract terms the results of different strategies that may be employed in situations of competition, situations where the competition and goals are proscribed by specified rules, usually much simpler than in games such as chess or poker. It has application in many contexts other than games, e.g. politics, economics, and, more generally in what is known as *decision theory*.

⁵ In a trick, each person plays one card. The person who plays the strongest card (strength defined by the particular game) wins that set of cards.

natural law. Nonetheless, the relationship of science and Christianity does, for many, come to resemble a zero-sum conflict.

This can be illustrated in the following way. Image all possible human knowledge as represented by the area contained within a rectangle. Now imagine that we divide up that space into two parts. One part being facts that science has been able to explain, labeled here "S"; the other part being facts that science has not yet explained, labeled "G," where "G" represents (to one way of thinking) the domain of possible activity by God.⁶ Let the first rectangle be the state of human knowledge five hundred years ago, and the second, the present state of human knowledge.⁷



Now, if one thinks that what science has not yet explained represents the domain of possible activity by God, then a zero-sum tension emerges between the two. Every gain for science constitutes a shrinking of the domain in which God might possibly act. Again, not every gain is felt as a loss for divine activity, for it is to be expected, by Christians and non-Christians alike, that much in "G" can be accounted for via natural laws. However, a zero-sum tension emerges if over time the advances of science add up to what constitutes a challenge to traditional notions of how and where God acts in the world. Hence, some Christians have either become very suspicious of science itself, or more commonly, have sought to emphasize its provisional character.⁸ By this means some have sought to deflect any claims in the sciences that appear to challenge a belief about God's action in the world. There are, of course, many non-religious people who also think that the advance of scientific explanation represents a diminution of possible divine activity, and amongst these there are those who interpret the advance of science as portending the demise of Christianity. If God exists at all, he is impotent to act in the world.

An exchange between Napoleon and Pierre Laplace, who had been Napoleon's tutor, illustrates this supposed tension. Laplace had written a book on the solar system, which Napoleon then read. The story has it that Napoleon was surprised that nowhere in the book had Laplace made reference to God, so he asked Laplace, "Why?" Laplace's response was, "I have no need of that hypothesis." For Laplace, once one has a scientific account of something, there is no need to bring God into the picture. If one extends this kind of thinking to all events that occur within us and around us, and if one thinks that all events are susceptible to scientific explanation, then at no point does one need the hypothesis of God. It is then a short step to the conclusion that the physical world is all that exists. Indeed, everything is ultimately the product of mindless physical processes. Today this outlook is widespread enough that many refer to it as "the scientific worldview" even though it is a philosophical interpretation of the import of the success of the scientific enterprise, not a conclusion that science itself makes.⁹

Cracks in the Picture

What's wrong with this picture of conflict between science and the Christian faith? They are a variety of problems with it. 1. It fails to acknowledge the aspects of the Christian worldview that lead Jews and Christians to embrace the scientific enterprise. 2. It confuses the success of science in its ability to account for the order of nature with an ability to account for all specific events taking place in history. 3. It assumes that if the God of the Bible exists, then we should expect to find gaps in the order of nature, places where no explanation in terms of natural law is possible. 4. It assumes that if there are no gaps in the order of nature, we can infer that there are no gaps in history either. 5. Lastly, it assumes that if an event can be explained in terms of natural law, then God had nothing to do with it. Each of these will be considered in turn. I will conclude with a few remarks about evolution as a part of natural history and the relevance of this to God's role in the origin and development of life.

⁶ Since human free choices, as well as actions in the world by non-material beings, could constitute other areas where scientific explanation is not possible, one could think of the area "G" as including the domain for these actions, as well.

⁷ The diagrams are not intended to represent actual proportions. It simply represents the rapid expansion of "S" over time and a resultant contraction of "G."

⁸ It indeed has a provisional character. All claims of science are open to being overturned should future evidence warrant such. However, the emphasis on this aspect of science by certain Christians can confuse this genuinely provisional character of science with the idea that all scientific theories, anything that goes beyond observable data, ought to be held quite tentatively. Scientific theories, however, vary from those that are well confirmed and accepted by everyone to those that are highly speculative.

⁹ One way of seeing this is to note that if there is anything lies outside the physical world, it will not be something that one will observe under a microscope or by any other scientific instrument. Also if it occasionally has an influence on events in the physical world, that influence will not be something that can be replicated by scientists. Unless such influences are common, there is no reason to suppose that they will arise in the course of scientists' investigations. Any time something is likely not to be observed, its not being observed tells one little about whether it exists.

1. The Judeo-Christian Worldview and the Rise of Science

One initial cause for suspicion about the conflict thesis is that it pits science against Judeo-Christian theism in a way that does not do justice to how most Christians (and Jews) in the sciences have viewed science. Many scientists today are Christians, as were the majority of the pioneers of science. Were the conflict thesis correct, one would expect that these people would feel an internal conflict between their allegiance to Christ and their commitment to science. Now, this may sometimes be the case, but, in general, Christians who are scientists do not view science as threatening their faith. Indeed, they often view the discoveries of science as strengthening their faith through strengthening their appreciation of creation.

This positive outlook on science by Christians is in part due to the fact that the Judeo-Christian worldview, far from being antagonistic to the pursuit of science, has in certain ways been a positive factor in both the rise of science and its continued development.¹⁰ To begin with, the Judeo-Christian worldview does not accept animism, the belief that the streams, trees, and land are animated by spirits. The physical world is not Mother Earth. All of nature is created by God and as such has value, but nature is not God, and the various parts of nature are not spiritual beings. The importance of this for the rise of science is two-fold. First, it permits one to investigate the natural world without fear of intruding upon the sacred or offending the spirits. Second, whereas animists will interpret natural events as actions of the spirits, theists are free to view natural events as taking place in accordance with an order instituted by God.

Equally important is that on the Judeo-Christian worldview, God is a God of reason. As such it is no surprise that God's creation should exhibit an order which human reason is able to comprehend. Most scientists experience an awe at the exquisite order that exists in nature. For theists this awe translates into an appreciation for the wisdom and greatness of the Creator God. The world exhibits marvelous design, the source of which is God. Regardless of what one thinks of the design argument in philosophical terms (topic for another essay), it has not just reinforced belief, it has been a significant factor in inclining many people, including scientists, to believe that there is a God.

2. The Order of Nature and Historical Events

The conflict thesis confuses the success of science in its ability to account for the order of nature with an ability to account for all specific events taking place in history.

The problem here can be brought to light by considering a mistaken assumption tacit in the two-domains idea. The illustration with the rectangle on page two was to represent all of potential human knowledge. Human knowledge, however, consists of both our understanding of general processes that take place and of our knowledge of specific events or specific facts. Thus, for instance, we can have knowledge of the process of how a mother gives birth. We can also have knowledge of the birth of a friend's firstborn. We can have the knowledge of how tornadoes develop, and we can have knowledge of a devastating tornado that hit a particular town on a particular date. We can think of the former kind of knowledge as knowledge of the general processes that underlie events and the latter as knowledge of particular events themselves.

Now, the scientific enterprise is primarily concerned with underlying processes and only derivatively, or by way of application, is it concerned with particular events. The distinction here is not exactly the same as the distinction between "pure science," and "applied science," for even in what one thinks of as applied science, the science of it concerns underlying processes and principles. For example, in the science of bridge construction one is concerned with the properties of particular structural designs. The construction of a particular bridge at a particular place will, of course, utilize elements of the applied science of bridge construction, but its construction is a specific event in history.

This distinction between underlying principles and historical events/facts is important when we ask the question, what does science have to tell us about whether God acts in history through the performance of miracles?¹¹ The answer is that science itself tells us nothing about this. It tells us what will transpire if there is not some intervention or special action by God (or perhaps some other supernatural agent), but it tells us nothing about whether such action by God can take place or has taken place. For instance, in the accounts of Jesus' life in the Bible, there is a narrative of Jesus walking on water, and even of Peter briefly walking on water to meet him.¹² We know that physically this is

¹⁰ I am not claiming here that science could not have arisen outside of the Judeo-Christian context nor that the Judeo-Christian view of God and the world is the only relevant factor. The factors are complex. However, the above-mentioned features of the Judeo-Christian worldview were contributing factors in the rise of science.

¹¹ In this essay, "miracle" is used in the narrower sense of referring to events which constitute exceptions to genuine laws of nature. "Genuine" is included here to indicate that what is in view is not merely events that are exceptions to our current understanding of what constitutes natural laws. This may be overturned, in which case, what we had thought to be a natural law is actually not.

¹² John 6 and Matthew 14

impossible, namely that if it were to happen and were no magician's stunt, it would require an exception to the laws of nature. Science tells us what the laws of nature are, namely how events will unfold if nothing beyond the natural realm interjects its power, but it tells us nothing about whether the supernatural exists and whether such exceptions to the laws of nature can occur.

Now, it is worth noting that all of the miracles recorded in the Bible consist of God bringing about a particular event at a particular time. They do not consist in God sustaining some aspect of the order of nature through ongoing miraculous activity. The following story illustrates what would be a miracle of the latter sort were it actually to take place.

I once heard a talk by a Christian in which he triumphantly declared that science had failed to account for cellular differentiation. "Cellular differentiation" refers to the process in the development of an organism whereby cells differentiate themselves into nerve cells, bone cells, blood cells, etc. (The recent discussions about stem-cell research pertain to this, for stem cells are what might be called generic cells, cells that have not yet differentiated into a cell designed to perform a specific function.) As far as I know it yet remains a mystery as to what triggers the development of the right kinds of cells in the right places. The speaker in question, however, was making the assumption that this will forever remain a mystery so far as scientific explanation is concerned. His supposition, I assume, was that cellular differentiation must in every instance where it occurs be a miracle brought about by God.

If God were to perform miracles of this sort, miracles that fill a gap in the order of nature, then at some point (or points) in the development of science, we would come across such gaps and would find ourselves at an impasse in trying to give a scientific account of what is transpiring.

There are two important things to note with regard to the above comments. 1. Although, in one sense, every miracle will constitute a gap in what can be explained in terms of natural laws, the miracles in the Bible all concern specific historical events, not the underlying processes that constitute what we call the order of nature. 2. The advance of science concerns its ability to account for more and more of the order of nature. It concerns the processes that are present whenever events in nature are developing in accordance with the order of nature. We apply the findings of science to specific historical events on the assumption that the event in question does not involve a miracle, but the advance of science tells us nothing about whether miracles ever can or do occur. In a different essay I will address the philosophical arguments that have been given against belief in miracles, but the present point is that it is a mistake to think that the advance of science is squeezing God's ability to perform what I'll call "historical miracles" into a smaller and smaller domain. What it does constrain is the domain in which God may perform what I'll call "order-of-nature miracles." Hence the illustration with the two rectangles does not represent a conflict between the domain of actual scientific explanation and God's potential activity; it represents a conflict between the domain of actual scientific explanation and the domain wherein God fills gaps in the order of nature.

3. God and the Absence of Gaps in the Order of Nature

Another problem with the conflict thesis is that it assumes that if the God of the Bible exists, then we should expect to find gaps in the order of nature, places where no explanation in terms of natural law is possible. The mistake in this assumption can be brought out by considering an idea held by Isaac Newton. He thought that for the stability of the planetary orbits to be maintained, God must periodically adjust them. I do not know specifically what his reasons were for thinking this; perhaps he thought that without such adjustments the orbits would degrade and the planets would spiral into the sun. In any event, we now know that such divine intervention is not needed. The laws of physics are sufficient to account for the high degree of stability of the planetary orbits. (Indeed, one of the major accomplishments of Laplace's book on the solar system was to show that this is so.)

Now let's take this example and ask whether this result should come as a surprise to Christians. Christians believe that God is both all-powerful and all-knowing. Being all-powerful, he presumably had the choice of creating a world in which he would need to play celestial mechanic to keep the planetary orbits stable. He also had the power to create a world in which the stability of planetary orbits would be a consequence of the laws of physics instituted by him. Furthermore, if he is all-knowing, then he would have been aware of this latter option. Now, given the Christian understanding of God, what would a Christian expect God to have done? There is, of course, no way of knowing for sure what God's preference would be in such situations, and this kind of question is usually highly suspect for God is in many ways vastly different from us. Nonetheless, the reason why I pose the question is that, at least from our perspective, the latter solution is the more elegant solution. Hence we, at any rate, should not find it surprising that an all-powerful and all-knowing God would choose this latter option.

We could ask the same question with regard to cellular differentiation, and I suspect that our answer would be the same. To establish a natural order within which biological reproduction takes place in accordance with the laws of

physics and chemistry is certainly a much more elegant solution than having miraculously to make cellular differentiation occur in just the right way “by hand,” as it were, at every juncture where it occurs.¹³

These are specific examples, but one can ask the broader question as to whether it would ever be advantageous for God to leave gaps in the ongoing natural order if he has the option of not doing so. Leaving a gap could be a way of suggesting to humankind that he exists, but if God has revealed his existence to us in other ways—and both Jews and Christians believe that he has—then this is certainly no compelling reason for leaving such gaps. What’s more, if God were to do so, it would only reveal God’s presence after the gap had been discovered. In summary then, although Christians in the distant past likely would not have expected the world to be so exquisitely ordered, it is no surprise for Christians today given their conception of God.

4. God’s Role in History

The fourth problem for the conflict thesis is closely related to both the second and third problems. The second problem was that the conflict thesis fails to see that whereas science tells us about the workings of the order of nature, it does not tell us whether God ever works miracles in history. The third was that the conflict thesis assumes that one ought to expect to find gaps in the order of nature if the Judeo-Christian God exists. The question now is whether, despite both of these points, is there any good inductive argument from an absence of gaps in the order of nature to the presumption that no miracles will be found in history. What follows are three sets of reflections that count strongly against this inference.

First, strong inductive arguments ought to have the two following features. (a) When one is arguing from a known case to something unknown, there must be a similarity which one deems to be relevant to the conclusion one is drawing. (b) There ought not to be any dissimilarities that may plausibly nullify the extrapolation. In the case of an inference from an absence of gaps in the order of nature to an absence of gaps in the unfolding of events in history, the first feature is satisfied, but not the second. If one had no evidence for miracles ever having taken place in history, and if one had no reason to think that God might exist, namely, a being who is able (or even might be able) to bring about a miracle if he wished—if one had no evidence for either of these, then the inductive inference in question would be reasonable. In that case, the difference between underlying processes and specific events would not be a dissimilarity that would be deemed as plausibly undercutting the inference.

There are many who think that none of the reasons that Christians or other theists advance on behalf of their belief in God and in the actual occurrence of miracles have any merit. However, when people contend that science and Christianity are in conflict would not say that there is only a conflict for those who see no evidence whatsoever for the existence of God (or of miracles). This would hardly be a conflict thesis worth much. What they need is a case that is at least strong enough to persuade the agnostic. However, if we ask, should the agnostic find an inference from the lack of gaps in the order of nature to an absence of any miracles, the agnostic should be quite unpersuaded. Again the reason is that if one entertains at all the possibility that there might exist a being capable of bringing about miracles, then the dissimilarity between an ongoing feature of the order of nature and single events in history is one that may plausibly nullify the extrapolation. An agent capable of bringing about exceptions to natural law when it concerns individual events might well choose to do so upon occasion while not creating gaps in the order of nature which he must miraculously fill.

Second, the plausibility of thinking that such a being may do so, is considerably strengthened if one is aware of specific motives that the agent may well have for this choice. Since we are considering whether there is a conflict between science and Christianity, it should be asked, are there specific things about God and/or his will that are revealed in the Bible that would constitute specific motives for God, at least occasionally, to perform miracles? The answer is yes.

Here are three: (a) The God of the Bible not only cares about human beings, but desires to reestablish a personal relationship with them that was broken at the Fall. He also wants us to know his will with regard to how we live our lives and with regard to certain values and attitudes. This requires that we come to know that he exists and what his will is for us. Miracles in the biblical narrative often serve both of these purposes. Clearly they act as a sign that God is present and at work, but they often also reveal something of God’s character or will. Indeed it seems that even for God to inspire the prophets with messages requires the miraculous. Thinking of those cases where the prophet is inspired to reveal a message of which the prophet was not already aware; it seems that, at least in most cases, there is no purely natural means whereby the prophet would acquire the message. (b) God desires to bless those who trust in him. One way of doing this is to provide protection or provision, and sometimes this involves God working a miracle.

¹³ The latter would, of course, be no problem for an omnipotent being.

There are many such miracles recorded in the Bible.¹⁴ (c) According to Christian belief, at least a couple of miracles, specifically the incarnation¹⁵ and the resurrection of Jesus, are necessary in God's redemptive plan for humanity, his plan to bring people back into relationship with himself. Thus, there are reasons from a Christian perspective why God would occasionally in human history bring about a miracle.

Additionally, I have sometimes heard it said that it would not befit a God of order and one who has established natural laws to break one of his own laws. This, however, is a statement that makes a rather strange assumption. It seems to assume that if God has created a world that in its normal functioning exhibits what we call laws of nature, then God has an obligation never to suspend those laws or never to bring about an exception. It makes it sound as though laws of nature are moral laws, and if God brought about an exception, it would be morally wrong. However, there is no reason whatsoever to think that the laws of physics are anything other than regularities that reflect the way in which God has created this world. It may well be that God values the order that he has established and may only choose to make exceptions to it under certain circumstances—this is a matter about which the Bible is silent—but even if this is so, it would simply provide one possible explanation for why God does not perform lots of obvious miracles, it would not provide a good reason to think that God would never bring about miracles.

I conclude this section with an opinion. Most people who think that there is a conflict between science and Christianity are drawn towards this conclusion by one or more of the following: a specific issue such as evolution, a conviction that miracles have never actually occurred, or a conviction that if God exists and can bring about miracles, then he ought to do so much more often than he does.

5. God's Role in Natural Events

Proponents of the conflict thesis assume that if an event can be explained in terms of natural law, then God had nothing to do with it. Several things need to be said about this.

First, God, as the author of natural law, has established the laws of physics, chemistry, etc. as he saw fit. Hence, those laws are ordered by God so as to accomplish his purposes. For instance, consider the way in which life develops from fertilized egg to full-grown individual. Regardless of what one thinks about evolutionary theory, there is good reason to be surprised that the laws of physics are such as to render possible such a process.¹⁶ To say, "God has nothing to do with it," is to fail to recognize that he may be the one who has established the laws that make life possible.

It is worth noting that one does not need to be directly active in the unfolding of some event to have brought it about. A person brings about an event if he sets up the conditions that result in the event.¹⁷ The person who demolishes a condemned building by using explosives has set up the conditions under which the explosives demolish the building. Did the person demolish the building or did the explosives? The answer is both/and, not either/or. Likewise if God has set up the conditions that bring about the seasons, the falling of rain, the growth of living organisms, etc., then God can rightly be said to have brought them about.

Second, according to biblical teaching, God not only created the world but sustains its existence moment by moment.¹⁸ Apart from this sustaining work, nothing would continue to exist. Indeed all power comes from God. As a consequence, everything from the beating of our hearts to the fury of a hurricane is a manifestation of the power of God.

Third, given contemporary physics, it appears that the physical world at root is not deterministic. The past does not strictly determine the future. There is dispute over how best to interpret the probabilistic character of quantum mechanics, but many if not most physicists believe that the indeterminacy is not simply a reflection of our ignorance of what is actually taking place; rather the assumption is that the nature of quantum reality is itself indeterministic. If this

¹⁴ There is, of course, the question, if God is able to perform miracles to help people, why is it that he does not do so more often? To address this question here would lead us into an aspect of the problem of evil and suffering. I address this question in Apologetic Note #4. It is worth noting here that if there is good reason to believe that God has at times performed miracles so as to help individuals, then even if the Christian does not have a good answer to the problem of evil and suffering, this should not block him from believing that God does at times perform miracles.

¹⁵ The incarnation is the theological term for God taking on human form in the person of Jesus.

¹⁶ The surprise here is not just a human emotional response to a phenomenon that far exceeds current human engineering capacity. Most physicists who have investigated what the world would have been like had the basic physical constants been only slightly different have concluded that slight changes in any of these constants would have rendered it impossible for structures to develop that have the complexity required for any physically based intelligent life.

¹⁷ We do speak of a person inadvertently bringing about an event, but, of course, what is in view here are events or states of affairs that are intentionally brought about.

¹⁸ Hebrews 1:3

is so then God's setting up the laws of nature at the moment of creation will not determine all of subsequent reality. That I was born or that a severe rainstorm hits New York City on a particular day does not seem to be something that could have been determined by the state of the universe at its inception. Nonetheless, Christians believe that God's activity in the world is not limited to the broad features that are the consequence of the initial conditions of the universe, nor is it limited to God's sustaining everything moment by moment. Christians believe that God is able to answer prayer and that divine providence extends to small things as well as big. Moreover, the Bible at a number of places teaches that God is sovereign over all that happens. This does not mean that God, rather than the explosives, caused the building to collapse, nor that God, rather than the engineer in charge of the demolition, brought about the building's destruction. It also does not mean that everything that happens is what God wants to have happen. We humans do many things that genuinely displease God. Nonetheless, the sovereignty of God implies an involvement in all events, an active involvement. The aim in raising this theological claim is not to seek to unravel its meaning, but to point out that the God of the Bible did not simply get the universe started. He continues to be active in the world. The indeterminacy of quantum mechanics does not explain how God may work, but it does mean that how the future unfolds from the past is not solely determined by natural law.

Fourth, there are several ways in which God's continued action may be explained, but it must be granted that apart from obvious miracles performed by God, the mode of God's acting in the world is a matter of speculation. God may act by performing miracles that simply go unobserved by us. Many of these might be small enough in scale to be called "micro-miracles." Thus when God implants a thought into a person's head it might involve an neural event which if we could observe it in detail would be an exception to the laws of physics and chemistry. God also might work through the indeterminacy that lies at the root of contemporary physics by guiding the unfolding of events in such a way that he brings about states of affairs without there being an exception to the laws of nature. In this regard it should also be noted that a very small influence strategically placed can bring about consequences on a large scale that would not have otherwise transpired.¹⁹ The point here is not that one knows the way in which God continues to act in the world. The important point is that if one has reason to believe in divine providence, that is, that God does continue to act in the world, and if it appears that God, for whatever reason, is rather sparing in his performance of macro-miracles, then it is quite reasonable to suppose that God is working in ways that are not easily noticed by us.

Concluding Comments

Before concluding, there is one comment that I will make about the question of evolutionary theory and God's role in the origin and development of life. Earlier I spoke of the difference between history, the sequence of specific events, and the order of nature, consisting of underlying processes and general principles. It is important to reflect on the relationship of evolutionary theory to this distinction. The theory of evolution is a theory that both is about processes and is about specific historical events. Evolutionary biologists are both concerned with the mechanism at work and with the attempt to elaborate a sequence of past history. This mix of theory and historical reconstruction is what one would expect from the theory itself. It sees the development of life as involving a vast number of specific mutations, many of which could not have been predicted by an understanding of the underlying biological processes. What's more, specific mutations have the potential of routing evolutionary development in a quite radically different direction than it would have taken had that mutation not occurred. Whatever one thinks about how much of the origin and development of life current evolutionary theory is able to explain, that theory partakes both of history and the order of nature.

What then is one to think of an inductive inference from a gapless order of nature to a natural history that is devoid of miracles? One line of reasoning that would favor such an inference is the following. If God in his creation of this world chose to create a world in which the order of nature does not contain gaps that need to be bridged by miracles, then one might expect that God would create a world in which the origin and development of life would, as much as possible, take place through natural processes. One question that this line of reasoning raises is whether it is possible for God to accomplish it all through natural processes. The task of laying out, even in general, how life might plausibly have arisen, and this without divine assistance, has proven to be far more difficult than was thought fifty years ago. Furthermore, if the argument above is correct, then it is a mistake simply to subsume all of the origin and development of life, what might be called "natural history,"²⁰ under the order of nature. The distinction between single-events and general processes that undercut an inductive inference from a gapless order of nature to an absence of miracles in history also undercuts an inductive inference from a gapless order of nature to a natural history that never involves miracles on the part of God. True, the history in question this time is natural history rather than human

¹⁹ A fairly recent development in the sciences is the realization that "chaotic systems" are quite common. And, as mentioned in an earlier footnote, it is a feature of such systems that very small uncertainties about the state of the system at any given point compound rapidly, so that in a short time it is impossible to predict what the overall state of the system will be.

²⁰ The term "natural history" could refer to any event that takes place in nature, but given that the concern here is with the origin and development of life, it is used here to designate events in nature antedating humankind.

history, and true, some of the reasons for God bringing about miracles in human history would not apply to natural history, but there remains the difference between single events and regular or recurring processes. If God chose to work miracles in natural history it would involve historical miracles not order-of-nature miracles.

Christians vary widely in the range of positions that they hold with regard to how much God may have relied on natural processes and how much God may have worked through miracles. Questions of biblical teaching rightfully enter into the debate, including an understanding of the opening chapters of Genesis. On another occasion I will offer my own reflections on these topics.

In summation, Christians ought not to think that the advance of science is a threat to their faith. Indeed the wonderful accomplishments of the scientific enterprise ought to be seen as revealing how exquisitely God has ordered the universe that he has created. There are further issues that deserve careful discussion, but Christians ought not to be afraid of addressing them. Rather they ought to strive to understand both what can be learned through the sciences and what can be learned through Holy Scripture.