

John Polkinghorne

“Science and Faith in Understanding Reality”

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Michael Dowd (host): Welcome to Episode 30 of “[The Advent of Evolutionary Christianity: Conversations at the Leading Edge of Faith.](http://EvolutionaryChristianity.com)” I’m [Michael Dowd](#), and I’m your host for this series, which can be accessed via EvolutionaryChristianity.com, where you too can add your voice to the conversation.

Today, [John Polkinghorne](#) is our featured guest. [John](#) is a [Templeton Prize](#)-winning theoretical physicist and an Anglican priest. Knighted in 1997, he is the founding president of the [International Society for Science and Religion](#) and a founder of the [Society of Ordained Scientists](#). He’s the author of [five books on physics and 26 books](#) on the relationship between science and religion, including: [Belief in God in an Age of Science](#); [The Faith of a Physicist](#); [Quantum Physics and Theology](#); [Science and Theology](#); and [Questions of Truth: Fifty-one Responses to Questions About God, Science, and Belief](#) (with [Nicholas Beale](#)). The topic of our conversation here is “Science and Faith in Understanding Reality.”

Host: Hello John Polkinghorne, and welcome to this conversation on evolutionary Christianity.

John: I’m very glad to be able to join in it.

Host: I am, too. You bring a background steeped in the sciences and also steeped in theology. Would you share a little bit of your story: how you got to where you are and what have been the mileposts along the way?

John: When I went to university I came to [Cambridge](#) to study mathematics, because I was entranced with mathematics. It’s a very attractive subject (if you can do it), and during my undergraduate years I got interested in the idea that you can use mathematics to understand the physical world. So when I came to do my PhD, I did it in theoretical physics under the direction of a very distinguished Islamic physicist, [Abdus Salam](#). I worked in theoretical physics — elementary particle physics — for about 25 years. I eventually held a Chair in Cambridge and was a senior member of a large research group. I played a small part in the unfolding of the

standard model of the quark structure of matter. All that was very exciting and rewarding, and I'm very grateful for those years.

But in these mathematically based subjects, you don't get better as you get older. I felt that by the time I passed my 45th birthday, I had probably made most of the contributions I would be able to make to the subject. It was also changing—in the kinds of models that were established; the dust had settled. Speculative theories, like [String Theory](#), were coming along—which were less attractive to me. So I decided the time had come to do something else.

After thinking about it and praying about it and talking to my wife about it, I decided to become an [Anglican](#) priest. I felt it was the next thing for me to do—which I did. I resigned my Chair in Cambridge, and I trained for the Anglican ministry, and worked in parish life for about five years.

I realized, then, that there were bits of me—the academic and intellectual side of me—that weren't being greatly exercised in this. So I came back into the academic world, back to Cambridge. For the last 25 years, my principal intellectual interests and occupation have been thinking about how science and religion relate to each other. I want to take both of them absolutely seriously. I didn't leave science because I was disillusioned with it. Christianity has always been central to my life. I'm a passionate believer in the unity of knowledge and I want to hold those two sources of insightful understanding in proper balance with each other, and to benefit from both of them.

Host: That's great. I'm curious, John: I talk with a lot of religious people about embracing science on its own terms. For me, it's not about simply making science conform to my theological or religious perspective, but accepting an evidential understanding of reality on its own terms—and yet fully embracing *both* so that I don't just tolerate science or reconcile it to my faith, but for me it's actually an enhancement. Our best evidential understanding of reality has enhanced my faith; it's stretched my faith. It has in many ways deepened my faith—and I'm sure that's the case for you, too. I'm wondering if you could share a little bit about how you've made that integration. How have you brought the two together in such a way that there's a mutually enhancing dance, as it were?

John: I think science and religion are friends and not foes. I think basically they're friends because they're both concerned with the search for truth. They are obviously concerned with different dimensions of truth, and they ask different questions about the world. Science, essentially, is asking the question of *how* things happen—what are the processes of the world. Religion is asking, to my mind, the deeper and more interesting question, which is *why* things happen—the meaning and purpose and value at work in the world.

If I am to understand the world, I need both those sources of insight. The way I answer the two sets of questions, the *how* and the *why*, though they are different questions, they have to fit together in a way that is consonant with and makes sense of each other. So that's how I see the relationship between the two.

The search for truth is to be obtained through *motivated belief*. It's a different kind of truth we're looking at, and consequently the kinds of motivation that support it will be somewhat different. Science has access to the experimental methods; it can put things to the test, kick things around, find out what they're made of. In many other forms of encountering reality—both between ourselves as persons and also with the transpersonal reality of God—testing has to give way to trusting. If I were always testing to see if you were my friend, I would destroy the possibility of friendship between us. Equally, you shall not put the Lord your God to the test. It's just a fundamental fact for the spiritual life. So there are differences between the two, but they are, as I say, friends and not foes. They need each other.

Host: Yes. The fact that you touched on this relational element is vital. One of the things that we've learned about the nature of the universe is that it's all relationship. To think about how we are going to relate to our world—how we are going to relate to both the material and the nonmaterial aspects of reality—is one of the most important questions that a person asks in their lifetime. In fact, from an evolutionary perspective, I've come to understand spirituality as the practices and exercises that lead me and support me in being in "[right relationship to reality](#)." How do we come into right relationship to reality at all nested levels? How do we be in right relationship with our parents, with our children, with our siblings, with our neighbors, with our co-workers, our colleagues? How do we be in right relationship with the air, the water, the soil, and other species of our bioregion? How do we be in right relationship with the planet?

I think these are fundamental questions that aren't merely secular questions. These are religious questions. These are questions that I think our faith should support us in answering in ways that allow us to live in deepest integrity.

I'm wondering if you could say a little bit more about how we *relate* to God and how we *relate* to our own faith tradition, and how that's been for you?

John: Well, I think there is no single formal relationship in how we relate to things. It depends upon their nature. How we relate to the physical world, in one particular way, is that we can transcend it: we can put it to the test. We can use the wonderful secret weapon of experimentation to find out what's going on. Between persons we have to have a different kind of contact. We have to be respectful of the integrity of the other person. We have to meet in terms of mutual trust, rather than in terms of manipulation and testing in that sort of way. And, of course, even more so is that true when we meet the transpersonal reality of God, who transcends us.

Throughout all of our encounters with reality there's a relational experience. While you can write a history of physics in the last 200 years by saying that it has been the discovery of the importance of relationality (even at the basic level of the physical existence of matter), a purely atomistic picture of the universe has certainly proved not to be the case.

One of the big and amazing discoveries in 21st century science was something called *quantum entanglement*, which says that when two photons, for example, two quantum particles, interact with each other, after the interaction they remain mutually entangled with

each other. One of them might go very far away, but nevertheless the two retain an instantaneous power of influence upon each other. If I do something to the photon that was left behind in the laboratory, it will have an immediate consequence for its partner photon, say, behind the moon. So even at the level of basic physical constituents there is a deep-seated relationality. There is something in nature which resists atomism in that crass and simple sense. Nature fights back against such a simple reductionism.

Host: You've used the phrase twice now, "the transpersonal nature of God," which focuses on that dimension or that aspect of reality—of God, of the Divine—that will always transcend anything that we can know or think or imagine or experience. And yet, I know also that you value the immanent and the omnipresent nature of God. So how from your perspective would you speak of relating to God not only in the transcendent or the transpersonal but also in the personal? For example, if someone were to ask you, "Do you have a *personal* relationship to God?" what would you say?

John: Whenever we speak of God we are using human language and we're speaking of God in some stretched sense, some sort of metaphorical sense. Finite beings, like ourselves, will never catch the infinite divine reality adequately in our manners of speaking. But we speak about God in *personal* terms, because we believe that God is more like "Father" than like "Force." God is not just a single influence that is unchanging and unresponsive in any way. God does particular things in particular circumstances. God acts also to make God's nature known to us through acts of divine disclosure. In science, experimenters contrive experiments. In religious experience, encounters with divine reality come to us as gifts. God cannot be manipulated in that sort of way. The contrary is to make the error of magic, which is a bad mistake.

But, of course, as Christians believe, God is active to disclose his Divine nature in the clearest and most acceptable way by that deep and mysterious (and I believe, true) Christian belief that God was present in human form in Jesus Christ. To know about Jesus is to know about God. Does God care for individual people? Did Christ Jesus care for individual people? We all believe the answer is yes. That assures us that God cares for us, too.

In my own spiritual life there are two particular occasions, or moments of encounter with God, that are important to me. One is the regular life of prayer and reading the scriptures, which provide powerful spiritual influences. When combined with a quiet meditating reflection upon them, they often convey to us the presence of God and the truth about God. And also the experience of worship, particularly [Eucharistic worship](#), the regular weekly gathering of the Lord's people around the Lord's Table in the presence of the risen Lord is an extremely important and sustaining part of my own Christian experience.

Host: Many of our listeners have had, and continue to have, a deep communion with God in and through the Eucharist and in and through the liturgy. These forms of prayer, these forms of scripture reading, these forms of being present with other human beings in this common

endeavor to worship God is something that nourishes their soul. You also mentioned the presence of the risen Christ in the Eucharist. I'm curious, how has your understanding of some of the core elements, the core concepts, the core insights of the Christian tradition—how has your experience and understanding of those (if at all) shifted or deepened or in some way changed as a result of your science, as a result of understanding the world in an evidential, science-based way?

John: I think that science influenced my spiritual life in a peripheral way, really. Science is concerned with, basically, an impersonal dimension of reality. Nevertheless, that dimension of reality is shot through with a deeper, wonderful order. I work in quantum mathematical particle physics and the actual technique in that subject is to look for new theories with mathematical expression in terms of beautiful equations. And we've always found that the basic equations in nature are endowed with that remarkable order. The deep intelligibility and rational beauty of the world is very striking.

Theoretical physicists use a word quite frequently in conversations but, of course, they never use it when they write papers for the learned journals; the word is "wonder." As you learn a bit more through the discoveries of your community—about the deeper, marvelous structure of the world—that sense of wonder is a reward for all the labor and effort involved in doing scientific research. I believe that sense of wonder is actually a worshipful experience. It's praise of the deep and wonderful mind of the Creator that lies behind the marvelous order of the universe.

Host: In fact, I had the honor of being present recently to my daughter giving birth to my first grandchild, my granddaughter, and there was something profoundly holy and sacred about that experience beyond what words could even attempt to describe—the kind of language that's often used to describe experiences of God in scripture and throughout tradition. It was like that for me. I could only rely on metaphors to speak about it.

John: Yes, I think there are these deep dimensions of every experience. One of my favorite examples is music. If you were to ask a scientist as a scientist to tell you all that he or she could about music, I'd guess they'd have to say that it's a neural response (something that goes on in our brains) to the impact of sound waves on the eardrum. Now, of course, that's true—and in its way, it's worth knowing. But there's very much more to music than that. There's a very deep mystery in music by which this pattern of sound, which comes to us beat after beat, can magically speak to us truly of a timeless realm of beauty we encounter in that sort of way.

It's very important in our encounters with reality and our thinking about reality in the world in which we live to take seriously all these dimensions of experience. Physical science, by itself, merely describes something like a lunar landscape. It has information-processing, replicating systems in it. It doesn't have any persons in it. You need to take these personal dimensions about experience extremely seriously—they are not just froth on the surface of

what really exists, atoms and molecules banging into each other. They are absolutely significant and an indispensable part of reality.

Host: There's something about the personal that nourishes us at the deepest levels of our being. In the last nine years, my wife and I have traveled North America pretty much nonstop, and we have this deep love relationship with our continent of North America. Back about seven or eight years ago, we began to enter into a relationship with the continent in a personified form. So we now call North America, "Nora." We say we're falling ever more in love with Nora. There's something playful and goofy about that, of course, but there's something that's also profoundly *real*. I have a different relationship to this continent, now that I've given it a name—a name that's meaningful, a name that's playful, yes, but a name that's also meaningful, that allows me to actually have a different relationship to this continent than I did for most of my adult life.

I remember a few years ago in Dallas, Texas, an evangelical reporter asked me in a slightly frustrated tone of voice, he said, "Do you believe in a personal God?" And I said, "Do you believe in a personal continent?" He said, "What?" I said, "No, I don't just *believe* in a personal God; I relate to God *personally* and, as weird as it sounds, I relate to this continent that way too." I don't think he had any idea what to do with me. *[laughter]*

When I use the word *God*, what I'm thinking of, what I mean by that, how I interpret that word is I'm pointing to that reality, that fundamental [undeniable reality](#), that is present in every atom, in every drop of experience, and yet also transcends anything and everything that we can know, think, or imagine. It's like nesting dolls, Russian nesting dolls: dolls within dolls. I see God as that fundamental reality that includes yet also transcends all other forms of creativity. It very much is a *personal* relationship, even though that sounds weird to some on the secular side of things.

John: Yes. I think we live in a world that is shot through with signs of value—whether we see that in the beauty of the sunset, and certainly, of course, we see it in human relationships and our encounter very often with the experience of music. These are tremendously wide-ranging and deeply held experiences; we should take all that seriously. We should not treat these things as just froth. They're absolutely central to reality. And, to me, the most natural way of understanding this is to see the world as a Creation. For example, the deep order of the world that science explores is an expression of the mind of God. The fantastic fruitfulness across history, which started 13.7 billion years ago in a ball of energy, is now the home of saints and scientists and to which we look for God's purpose. I think our experiences of joy are shared in the Creator's joy and that our ethical knowledge, our intimations of God's good and perfect world, are all integrative, making sense of everything. For me, it is religiously deeply satisfying.

Host: I'm wondering if you could say a bit more about this whole enterprise of interpretation and how vital it is that we as Christians take our best science but then interpret it in ways that are soul-nourishing and that call us to a deeper relationship to God.

John: I think that's very important. First of all, the media like confrontation. They like to portray the interaction of science and religion as a battle of the fundamentalists on both sides. I say, "A plague on both their houses!" I want to be in the middle. If the question really is metaphysics, scientists very often don't like the word metaphysics. They often say, "I have no truck with metaphysics—just the facts are all I need." But that, of course, is just ridiculous. *Everybody* has a metaphysic, because everybody has a worldview—and that's what metaphysics means. We think metaphysically every time we interpret the whole of experience; it is necessary and inevitable. Everybody has a metaphysic.

The different metaphysical positions differ by what they treat as their unexplained starting point. Every metaphysical position has to rest on a basic brute fact which is the basis of its understanding. All else then flows from that. There are two choices. One is *materialism*, which takes the laws of nature as your brute fact, and matter as your brute fact. The other is a *theistic* position, which says the divine agent, the Creator, is the brute fact on which we rest our understanding of the world. When I think of the richness of our experience on many levels, and I think about the importance of *personal* experience, as well as the *impersonal* experience that science discusses, it seems to me overwhelmingly much more persuasive just to take the will of a divine agent as the basis for understanding the world, rather than just the brute facts of matter, which seem to me actually to have such properties of intelligibility and fruitfulness that it points beyond itself and demands further explanation.

Host: It seems to me that all of us who embrace both evolution and our Christian faith value evidence as something more than just secular. The way I speak about it is that I see *evidence* as the way that God is communicating to humanity as a whole today—that God continues to communicate through our dreams and our intuitions, our feelings, circumstances, and relationships, and that sort of thing. But God is also communicating to us *collectively* through historical evidence, scientific evidence, and cross-culture evidence. That is, it's legitimate to see *evidence* as divine communication. Does that ring true for you, or do you have another way of languaging that?

John: It certainly rings true for me. I believe that the way we find truth is through *motivated belief*. I believe that I have motivation for my scientific beliefs and am quite happy to explain those to people if they want to hear about them. I also believe I have motivation for my religious beliefs. I have a fair number of friends in the academic world who are both wistful and wary about religion. They're wistful because they feel science doesn't answer every question about this rich and many-layered world in which we live. But they're wary about religion because they think that religion is based simply on submission to authority—shut your eyes, grit your teeth, believe these impossible things which some unquestionable authority says: that's what you've got to do. And, of course, they don't want to commit intellectual suicide. Neither do I.

I always try to show them that I have *motivations* for my religious beliefs, besides my motivations for my scientific beliefs. Of course those are different *kinds* of motivations, and they may think those motivations are not adequate. That's for them to decide. But the motivations are there, and they need to take them into account. So when various [New Atheist](#) authors say that religious people believe *against* the evidence and that sort of thing, that's just an untrue caricature. I believe the question of truth is as central for religion as it is to anything else.

Host: I think one of the things that often gets leveled as a criticism towards those of us on the religious side of things is not that we don't value the evidence. It's that we interpret the same evidence in a different way. That's not always the case, but I think that's definitely been true in my situation. I'm less interested in the question of what's the only one right interpretation of any set of facts. I'm frankly more interested in the question, how can we interpret this evidence in a way that calls us to cooperate at a larger scale than before?—so that we can cooperate at across ethnic, religious, political, and other differences in service of a healthy future for all of us, but in a way that also calls us to deeper integrity, more expansive love and compassion, more generosity: “the fruit of the Spirit,” as [the Apostle Paul](#) would speak about it. So I think the onus of responsibility is on those of us who *do* embrace evolution, those of us who *do* embrace an evidential, science-based understanding to find ever more holy or meaningful or sacred or soul-nourishing ways to communicate that. And I think when we *do* that, we'll see a lot of the conservatives come onboard, which they won't until we do that.

John: I certainly agree with you that the question of interpretation is fundamental. You can see that within science itself. People will sometimes say that science deals with facts and religion just deals with opinion—that something might be true for you or true for me, but *not* true in a general sense. I think that's a very bad mistake. And it's a very bad mistake for science, because there are no interesting scientific facts that are not already interpreted facts. So the question of interpretation is fundamental to physics—and, of course, it's also fundamental to all experiences. I think the test of the *quality* of the interpretation is the degree to which it is adequate to the whole range of phenomena that you are trying to understand. That's what we look for, I think.

Host: I agree ... John, if somebody were to ask you, how would you describe your own position as separate from or different from Intelligent Design?

John: I think the [Intelligent Design](#) movement makes a couple of mistakes. One is a scientific mistake, and the other is a theological mistake. The scientific mistake is they claim to have established the existence of “irreducible complexity”—that is to say, that there are certain molecular systems which are composed of a number of different parts, and they say it doesn't work unless *all* those parts are in place and therefore, of course, the system couldn't have been

built up gradually through some sort of evolutionary process. Now that would be a very remarkable scientific discovery if it were actually true, but I don't think they've actually made that discovery. The reason they haven't made it is they treat these little molecular systems in isolation, as if they have to simply come on their own—but that's not how evolution works.

Evolution develops this sort of subsystem for this sort of purpose, and another subsystem for a different purpose, and then opportunistically puts the two together for yet a *third* purpose. Now, that means to say that you can't just look at these things in isolation. So I don't think they have established "irreducible complexity." But *behind* this—not very often explicitly recognized by them but obviously tacitly present—is the theological mistake that if nature did this, then God didn't have a hand in it. The underlying premise is that we can only see God at work when nature falls short of doing what we see happening. Now, I think that's just a bad mistake.

The God who is the Creator of nature acts as much through natural processes as in any other way—by and large in evolutionary processes. A great English thinker and friend of [Charles Darwin](#), [Charles Kingsley](#), said that the evolutionary process is "the way that God allows creatures to make themselves." God has endowed the world with this fantastically deep potentiality, and now allows creatures to explore and bring to birth that potentiality in their own sort of way. That's the theological way (in a nutshell, it seems to me) to think about an evolving world—and I think that's a very deep and very satisfying theological way of thinking about what's going on in the world.

The Christian God can neither be just an indifferent spectator, having set it all going and now just watching what will happen. Equally, the Christian God cannot simply be a cosmic tyrant whose Creation is simply a puppet theater in which the Creator pulls every string and creatures just dance to the Divine tune. The Creation in which creatures are allowed to *be* themselves and invent themselves is, if I venture to say so, the most fitting form of Creation the God of Love could have brought into being.

Host: That's great... I want to shift to a slightly more personal focus, which is this: Throughout human history in cultures all over the world, there have been certain feeling-states that human beings have always needed in order to thrive. We don't thrive as human beings if all we can do is look to the future with fear. We *do* thrive when we can look to the future with trust—including a future that will ultimately be a future without us because we will die. We don't thrive if all we can do is look to the past with resentment or guilt. We *do* thrive when we can look to the past with gratitude. In fact, in some ways that's part of what therapy is about: helping people to reframe, to re-story, to re-experience aspects of their past, where before they simply had resentment or guilt and they were not able to find something to be grateful for. We also do not thrive if we're overwhelmed with the challenges of the moment. But we *do* thrive when we're inspired to be in action—no matter what the challenges or difficulties of the day.

Throughout most of human history, the only way that people could consistently have access to these fundamental feeling-states that human beings have always needed to thrive were from *beliefs*. There was no other way. We didn't have the knowledge of the larger scales, the smaller scales, and everything in between to be able to have *knowledge*-based ways of

accessing these fundamental feeling-states. Now, we're beginning to do exactly that—and that's where so many of us have found that an evolutionary worldview has been helpful. For myself, speaking very personally, when I look to the future *now* (and because I have this deep-time understanding, these deep-time eyes, as it were, giving me a depth perspective on reality), I have a deeper trust when I look to the future and a much more profound gratitude when I look to the past. And I'm inspired to be in action.

So I want to ask you, in a more personal way, How has your understanding of reality that you've been given through your scientific understanding of the world, how (if it at all) has that understanding increased or enhanced or expanded your trust and your gratitude?

John: The scientific story of the universe is a story of an incredible evolving and developing fruitfulness. If you ask what's the most astonishing thing that's happened in the 13.7 billion year history of the universe (that we know about, anyway) it has been the dawning of self-conscious beings here on Earth. In our ancestors, the universe became aware of itself, and science itself became a possibility. So it is a world of great fruitfulness, and therefore seems to hold meaning and purpose in it. There's also, of course, much frustration and wastefulness as well. And that's one of the problems, I think, that the evolutionary view has to face. Evolutionary theory tells us we start with bacteria and end up with human beings. On the other hand, there is a tremendous tale of extinctions and wastefulness and suffering on the way.

If we think of evolution in the manner that [Charles Kingsley](#) suggested, as “creatures making themselves,” that kind of exploration will have fruitfulness—but it will also have ragged edges and blind alleys. The process underlying evolution is, of course, genetic mutation—producing new forms of life, which are then selected and preserved through natural selection. But it's inevitable that if some germ cells are able to mutate and produce new forms of life, other cells—body cells, somatic cells—will also be able to mutate; and sometimes when they do that, they will become malignant. So the anguishing fact of cancer in the world is not gratuitous. It's a necessary result of the process by which creatures make themselves. Now, I don't suggest that removes all our anger and anguish we feel about the way the world is. But it is, I think, helpful in that respect.

Then there's another problem, which arises when we look into the future. We all know that in the end all the processes of this world will end in futility. We are all to die on timescales of tens of years. The universe is going to die, to become ever more cold, ever more dilute. Carbon-based life will disappear everywhere within it in due course, after many hundreds of billions of years. That's a long, long time-scale, but it is going to happen. Steven Weinberg once said that the more we understand the universe, the more it seems to be pointless. I think if that horizontal story which science tells were the *only* story to be told, then Weinberg has a point. But of course I also have a theological story of God's faithfulness. I believe there *will* be a destiny beyond death, for us individually and also for the universe itself—not because that's a natural expectation but because of the faithfulness of the Creator. Beyond the death of this world there will be the life of the world to come. So I think we have to also have that element of

hope, that element of trust that in the end nothing of good will be lost but will be transformed in the path and the purpose of the Creator.

Host: It's interesting because as you were speaking, I thought to myself, "Wow, a whole lot of deeply committed Christians are going to find the way you language that just then to be absolutely right on." For myself as [a Christian naturalist](#), I interpret things somewhat differently. One of the things that gives me deep hope is the recognition that both the pre-human life and human life keep finding ways of cooperating at larger scale and larger spheres of cooperation, compassion, and commitment. I think that trend, that tendency is one that allows me to deeply trust the process. So again, we come back to this sense of we're always going to be interpreting—and that you and I may interpret differently how we see the past and the future in ways that give each of us hope and yet we both get to that place of trust, of hope, as you said.

John: Well, how you see the ultimate purpose and meaning of the universe depends upon the timescale. I agree that over manageable timescales—certainly timescales of thousands, maybe millions of years one can imagine the unfolding unity of life developing with increasing diversity. But in the end I think there's no escape from the second law of thermodynamics; there's no escape from the rising of chaos. In the end there's disorder where there was order, simply because there are many different ways to be disorderly. And when the universe gets down to a temperature of just a few degrees above absolute zero after an enormous dilution and all the normal material particles will decay, that world is, I think, a world of futility. I think it essentially will have died. But I believe that God has a destiny beyond the world. That's not a belief or hope that science can adjudicate one way or the other. It's a theological hope.

It seems to me that the Christian has always been, not of unbroken survival. The Christian hope has always accepted the reality of death—both for individuals and for others—but believe that there is a more ultimate reality than death itself, which is the reality of the faithfulness of God. And, I think, it's true that with a transformation of the world there is a truly lasting hope. Life on Earth will go on, I'm sure, for quite a long while. In a few billion years, the sun will explode and become a red giant that will kill everything on Earth. Maybe life will have migrated somewhere else. But, in the long run, I don't think you can postpone as far as the present process is concerned, in terms of what science on its own is able to describe, you can't withstand the eventual death through cold and dilution.

Host: One of my wife Connie's great contributions to the world, as I see it, is the teaching that she does around [death](#), because I think that you can come at this question both from a theological or religious perspective but also from [a purely scientific perspective](#). We can understand, for example, that if it weren't for the death of stars, there would be no Periodic Table of Elements; there would be no planets, there would be no life. If it weren't for the death of mountains, there would be no healthy soil. If it weren't for the death of fetal cells in the embryonic stage of development, we would all be spheres. If it weren't for the death of plants and animals, there would be no food, and on and on. That is, how we can understand death

from our best scientific understanding that actually can nourish people religiously—whatever their religious backgrounds or beliefs. It's simply about what do we know factually about the nature of death at all scales of the universe that *does*, in fact, validate more ancient religious understandings—such as you just articulated: that death isn't the final answer. There's a creativity that emerges out of that and we can speak about that in religious language, in terms of the heart of God and God's faithfulness and God's nature and that sort of thing. Or we could use more secular language to speak about that.

This cosmic understanding that [death is no less sacred than life](#), to use that kind of language, that death is natural and generative at all levels of reality: I've seen how that allows people to look at the possibility and the reality of death from a different sort of place. It allows us, at least allows *me*, to trust the process and to recognize that, yes, even when the entire universe achieves a heat death, that I don't see that as futile. If the universe has been in this amazing process for billions, tens of billions, hundreds of billions of years of complexity and creativity and then it ultimately achieves a heat death, I (like you) do not see that in a negative way. If that's part of, to use religious language, God's will—if that's part of the way reality is actually structured, I can say yes to that. That's [a universe I can say yes to](#), even though I don't know rationally what that means.

John: Well, I see, of course, that the universe has had an astonishing and fruitful history. I understand that, biologically speaking, the death of one generation is necessary for renewed life of the next generation. But, in the end, that can't go on forever. A heat death means a universe in which *nothing* happens. And that doesn't seem to me a wonderful fulfillment. I believe there is a fulfillment, but I believe it comes through death and transformation and not just through the unfolding of the present process. I've never had that sort of degree of cosmic optimism.

Host: I'm not sure I'd call it optimism. But, yes. I think we get that trust or that hope in a slightly different way, but it certainly seems to me that we both get there.

John, you've written a number of books in the realm of physics, but you've also written several dozen books on the relationship between science and religion. You also, of course, won the [Templeton Prize](#) back in 2002. I'm wondering if you could talk about a few of the books that you really want to make sure that our listeners know about.

John: I'm all the time trying to find truth through motivated beliefs, and I'm always trying to some extent to attain the unity of knowledge—which seems to me something very important, in other words, to hold together science and religion. Being a scientist I choose a topic and I say what I can about it—and when I've said it, I stop. So I have a lot of short books. One is my [Gifford Lectures](#). It's called, [The Faith of a Physicist](#). That book looks at central issues of Christian belief. In fact, it looks at clauses that come in the Nicene Creed. The subtitle of the book is, "Theological Reflections of a Bottom-Up Thinker." I have to call myself a bottom-up thinker because I think the way to find truth is to move from experience to understanding—not

to start, so to speak, on the tenth floor with clear and general ideas, and then trying to descend to thinking about things in particular. The difficulty of top-down thinking is that what the self most fears are ideas that turn out in the end to be neither clear nor certain. This is an attempt to take different Christian assertions, like the nature of Christ and God's purposes in nature, to say what makes you think that might be the case. What is the motivating evidence for it? So I think that if someone were interested in exploring Christian beliefs from that bottom-up way, they would find that book interesting.

I wrote a book about five years ago, called [Exploring Reality](#), which tries to look at a whole slate of questions: at the evolving world, the nature of time, and so on. It gives a sort of tour of what I think are some of the critical issues between science and religion.

And then I wrote a book, called [Quantum Physics and Theology: An Unexpected Kinship](#). That book tries to look at how quantum theory developed, producing unexpected, counterintuitive quantum beliefs. I compare them with the development of counterintuitive theological beliefs, like: the duality of divinity and humanity in Jesus Christ.

And I have a new book that's going to be published in the early summer of 2011. It is called [Science and Religion: In Quest of Truth](#). Again, it's an attempt to look at these things in an integrative way.

Host: You also wrote a book called [Living with Hope: A Scientist Looks at Advent, Christmas, and Epiphany](#).

John: That's a little book, which was written as a series of reflections to go through the Advent season. It takes ideas from a rather longer book I wrote, called [The God of Hope and the End of the World](#). It tries to take seriously what I believe is science's reliable prediction that, in the end, this particular universe is going to end essentially in futility. And to see whether it is coherent, well motivated, and understandable to believe that God has a destiny beyond death, both for ourselves and for the universe. I tried to relate that in some detail in that book.

Host: One of the things that I've been sensitive to in this conversation is, no matter how diverse we are and how many different kinds of Christians and forms of Christianity that embrace an evidential understanding of reality, it seems to me that one of the things that we also share in common is a commitment to the health and the wellbeing of not just our religious group or our nation-state or our own soul salvation (not to deny those), but that we're also deeply committed to a healthy future for this planet and its species.

John: I certainly agree. Religious people should see that the whole of creation matters to its Creator, to see the whole Creation has a destiny of an appropriate kind. Therefore human beings are not the only source of interest or concern for God or for each other. The rest of nature on our planet and the rest of nature on the grand scale of the universe is not just there to be the backdrop of the human drama. It all matters to God. It all has a destiny. And it all has

value because of that. I mean, why should we care for Creation? Why shouldn't we just exploit it? The answer is, it's not ours to exploit in that sort of way. We are not the landlords of Creation. I think that understanding is a strong incentive to be ecologically responsible about the world in which we live—because it is God's Creation.

Host: John Polkinghorne, thank you so much for your bridge-building work in the world, and for sharing your ideas and your experience with our listeners on the leading edge of faith.

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