

“Current Controversies in the Religion & Science Debates”

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MICHAEL CROMARTIE: We’re delighted that Dr. Ard Louis has come all the way from Oxford to be with us, where he’s a reader in theoretical physics at the University of Oxford. Ard grew up in Africa, but he did his Ph.D. in theoretical physics at Cornell, and I gave him the broad topic “Current Controversies in the Religion and Science Debates” because there are, as you all know, a lot of controversies in the religion and science debates. I’m eager to hear which ones he thinks we should highlight. Ard, thank you being here.

DR. ARD LOUIS: It’s a great honor for me to be here with all of you. So what I’m going to do today is talk a bit about the creation evolution debate and go into the God, atheism and science debate.

If you’re thinking how do physicists think about the world, this is what a great mathematical physicist, Henri Poincaré, said: “A scientist does not study nature because it is useful. He studies it because he delights in it, and he delights in it because it is beautiful. If nature were not beautiful, it would not be worth knowing, and if nature were not worth knowing life would not be worth living.” And Paul Dirac, the great mathematical physicist at Cambridge, was once asked, “What’s your fundamental belief?” He thought about it for a while, and then he said, “My fundamental belief is that the laws of nature should be expressed in beautiful equations.”

That brings me to the first big question or controversy, and you’ll probably see it discussed in the newspapers a lot, which is how can we look at things like other universes. Why do physicists make claims that there might be a multiverse?

That is actually a very interesting extension of this idea that mathematics imposes itself on world. You probably know that there are four fundamental forces in nature, the strong, the weak force, electromagnetic force, and gravity, and those first three can be

unified in one theory, and the only little bit that's missing in that is the Higgs boson that they're trying to find in Cern in Geneva, but that's really the last little thing.

If all we find is the Higgs boson, in honesty it's going to be really, really boring because all that does is just confirm what we think we already know, which is that these three forces can be unified.

What's a really interesting question is "can we also unify the weakest force, gravity, into some mathematical framework that makes all these forces come under one basic principle?" One of the ways of trying to do that is string theory. These theories are based on some special mathematics, and these mathematical principles turn out, in certain cases, to have for example 10^{500} false vacuums, and so this is where the idea that there are 10^{500} different possible universes comes out.

And one of the really interesting questions is: is that still science or has this become philosophy? Because it's unlikely we're ever going to be able to observe or falsify the prediction that there are many universes. It's kind of a wild and crazy idea, and it makes antimatter look very tame.

And the fact is, I think we probably won't ever be able to falsify it. So this is one of the really interesting questions or controversies that's happening now, and I think there's going to be a discussion for the next millennium maybe, this question of what about other universes. This may be something more like philosophy than like science, but it is a fun thing to think about. So that's one little quick thing that we can get back to in the question session.

A related topic, in fact, and one of the drivers behind trying to come up with multi-verses is the following question: why is the universe the way it is? One of the amazing things about the universe and about physics is that it's very fine tuned for life. In other words, if the laws of physics were just slightly different we'd have a biologically sterile universe.

Sir Fred Hoyle is the man who coined the words "Big Bang," and that was a pejorative term because he had an alternative theory, the steady state theory which had the universe existing forever. He was a very committed atheist, and so he didn't like the idea of Big Bang because the Big Bang suggested a beginning, which suggested a

beginner. But like many pejorative terms, it kind of stuck. So that's where the word "Big Bang" comes from.

One of the really interesting issues is that the early universe only makes hydrogen and helium and a few other things, whereas to be chemically interesting you need things like carbon, oxygen and heavier elements, and so the question is where did those heavier elements come from?

Well, what scientists have worked out, what Hoyle worked out, is that these come from a nuclear reaction. So the sun, our own sun, is a giant nuclear reactor. The hydrogens in the sun fuse together to make helium, and that generates energy. The sun is a giant thermonuclear reactor. A hydrogen bomb uses exactly the same physical principle.

So what's going to happen is at some point, if the sun keeps burning, it will use up all of its hydrogen, and so all of the hydrogen will have been turned into helium. At that point the heliums will start to fuse into something heavier, et cetera, et cetera. That's how you get the heavier elements, and at some point a star like the sun will burn up all of its elements that can go through that process of fusion. These elements get spread if then the star then turns into a super nova that spews this dust throughout the universe.

So you and I, all of our heavy elements, are, in fact, made in the giant nuclear furnaces of the stars. They're then spewed around the universe. Every element in your body that's not hydrogen or helium was once created inside a giant star. So we're made of stardust. A romantic notion, I think.

But here's an interesting point. So Hoyle was thinking about how does hydrogen make something like carbon. Some of you may remember that hydrogen weighs one, and helium weighs four. Carbon is 12. So you need three times four, three heliums, to make one carbon, and what Hoyle worked out is that that reaction from three heliums to one carbon is going to be very unlikely, and so he did the calculations, and it looked like it wasn't going to be able to make nearly the amount of carbon and together with some side reactions for oxygen, that we need for life.

Now, Hoyle was a very clever man, and so he said, "Well, let me turn that question around. I know that I'm here. So I know that this reaction must have happened." So he back-calculated it, and he said, okay, the only way it's going to work is if what we call a

resonance, which is unstable energy level, in the nucleus of carbon is at just the right energy so that it enhances the probability of the heliums making carbon.

And so he made the calculation. He said, well, there's a resonance at just the right energy, and he went to look at the nuclear data tables to find it, and it wasn't there. Okay? So he was a bit puzzled. But he was a very stubborn chap, and so he phoned up Willie Fowler at CalTech and said, "You know, you missed something. There's a resonance at this energy level. I know exactly where it is. You've got to go look for it."

They looked, and there it was at exactly the energy that Hoyle predicted. It turns out that if this energy is up or down by just a few percent then this reaction doesn't work. The universe would be chemically sterile and, therefore, biologically sterile. Hoyle famously said, "a common sense interpretation of the facts suggests that a super intellect has monkeyed with physics and biology," and he said his atheism was deeply shaken.

I should just point out for people who are Christians like myself, fine tuning is not a full proof for God, but it does seem more consistent with theism than atheism. Sir Martin Rees, the Astronomer Royal, famously said we seem to have three choices. We can dismiss it as happenstance. We can claim it as the workings of providence or, his own preference, we may conjecture that our universe is an especially favored domain in a still vaster multiverse.

On balance, I think it's going to be hard to know which way it goes, but there is something really beautiful about the way the world is; something very striking and spectacular.

Next we're going to go to this question, creation or evolution: do we have to choose? So I'm a Christian, probably something close to what you might call an Evangelical Christian, although I realize that's a word whose definition has become complex, but I work on evolution in my lab. But for some people that's a little bit like saying that I am a vegetarian butcher.

Unfortunately, the creation or evolution debate is really where a lot of the controversy lies in the questions of science and religion, and so we could talk about "evolution and its discontents," with Charles Darwin. There are all kinds of ways in which ideology has

gotten attached to these scientific questions that Darwin was trying to answer, which were: how do we get the diversity of life that we see?

In the United States something between 42 to 47 percent of the U.S. population agrees that God created human beings pretty much in their present form at one time within the last 10,000 years or so, and it's much higher among Evangelicals.

In 2009, the Darwin year, there were a lot of polls, and somebody did one at the University of Wageningen in the Netherlands. He polled 415 staff and 215 academics. So academic staff of all kinds, and 30 percent did not think that variation and natural selection is sufficient to explain life on earth. There was a very fascinating poll in the U.K. as well, which had one question whether evolution alone is not enough to explain the complex structures of some living things—it suggests that the intervention of a designer is needed at key stages. Fourteen percent of the population thinks that is definitely true. Thirty-seven percent thinks it's probably true, which means that 51 percent believe in some version of what we might call intelligent design. Again, these are strikingly high percentages.

The makers of this poll, their argument was that the reason it is that way is related to the way that evolution is often portrayed in the media, the way it's often sold by its best known popularizers, not just as a scientific theory, but as an ideology, a story that tells us where we come from and how we should live.

And that brings me to the question of what I mean by the word “evolution,” and I think almost all of the controversy hinges on what you mean by the word “evolution.” So you can think of evolution as natural history, the idea that the world is old, that more complex forms follow from simpler forms.

And for people that are Christians, it's actually the natural history question that they most need to link up with a book like Genesis and say, “Well, how did these things line up together?” So that's where the controversy really should be in the Christian public.

The second question, which is to say how did this complexity come about, why did we, the mammals, eventually rule the roost? And where did mammals come from? Those are the kinds of questions that Darwin really answered, not natural history, but the question of how did this happen, and his argument was that this evolution came as a

mechanism which is basically mutations that generate variation and a natural selection that selects those various things. So most Christians would agree. They will credit this mechanism. They just disagree that this is the mechanism by which complexity came about.

But the real difficulty is that the word is often also used as a kind of big picture world view. Richard Dawkins said, "Darwin made it possible to be an intellectually fulfilled atheist." I think the real difficulty with this question of evolution and creation has to do with the way that the science of evolution has gotten all of these other things added onto it. It has become a kind of ideology.

And so I think that the average person in the pews in the United States or, in fact, even just the average person on the street clearly in Britain, is uncomfortable with this. They're uncomfortable with this idea that it's all purposeless. So when you ask them the kind of question that you saw in the poll, they think you're asking them: do you believe that life is somehow purposeless?, and so their natural inclination is to say no.

And I think this is very problematic for those of us who are scientists because in the end it's very important that the public understands what we do and supports what we do.

So basically if you're interested in the debate among Christians, then really there are four different approaches that Christians have taken.

One is some kind of creation science that says that science is incorrect. The earth is 10,000 years old or something like that. It's interesting that this movement has really only become popular in the last 50 years. It's a very modernist movement in many ways. Even at the origins of the Fundamentalist Christian movement in the United States, there was a lot more variation in views that was allowed in the earlier part of the 20th Century than might be the case now.

Young Earth Christian Science is no longer just an American phenomenon. The biggest Young Earth organization in the world is based in Turkey. So Creation Science has become something popular. I think we're going to see this spread throughout the world. This is a controversy that's not going to go away any time soon.

And of course, another very controversial topic in the United States, particularly, has been the Intelligent Design movement, where, in fact, proponents hold any of these three different theistic views, but they essentially argue against evolution number two, my second definition, the idea that natural selection and variation can explain the complexity we observe. They argue that that's not correct.

So this is my little typology of the different arguments that are out there, and almost any time you read a commentator talking about this, they will be speaking either from one of these three perspectives if they're a Christian or perhaps these four perspectives, or they'll be talking about evolution itself and often mixing up these different meanings of the word.

Somebody will say, "We know evolution is true because we have the bones of dinosaurs. Therefore, man is the result of a purposeless and materialistic process." And, in fact, it's that mixing of these definitions that is at the origin of a lot of the confusion.

Now, I just want to get into one thing which irritates me a little bit about the public debate. One of the reasons why laypeople have difficulty with evolution has to do with the language. We speak about random mutations and natural selection, and the problem is that random suggests something like purposeless, not having a purpose. It's random, whereas, in fact, in physics, or in engineering, if you want to solve a complex problem or particularly a high dimensional complex optimization problem, we almost always use methods that in some sense or other use what we call random number generators, the technical term for these are stochastic methods. That's a fancy way of saying random. It's just a more technical term without the metaphysical overtones.

So, for example, in the picture I showed you of the viruses I designed, we designed them with the random method, but if you put those viruses down and we let them move around randomly, they'll always form this particular outcome, this particular shape. So even though I'm randomly generating the moves of these particles, they always have the same outcome.

And in fact, the price of your stock portfolio is set by a bunch of quants running these various kinds of stochastic Monte Carlo algorithms. Okay? Even the way people design bridges uses these kind of stochastic algorithms.

So if God wanted to create something like the complexity we see around us, it would seem that the most efficient way of doing that would be to use some kind of random or stochastic optimizer. But the problem is that that word, that metaphor, causes all kinds of problems.

How you extract meaning from the science is a lot harder than it looks because two people might describe the same set of phenomena in two different ways.

What's also interesting about this is another bigger discussion that's going on in the scientific community and the philosophical community at the moment, which is a question of emergence. So what causes what? Dawkins is very much of a reductionist. He starts down at the very bottom level and tries to work up, whereas Dennis Noble is one of the founders of systems biology, which is saying look at the top down. What's happening at a higher level and what is causing what? Is something emerging from the bottom up or is something supervening from the top coming down?

The last thing I want to do about evolution is to talk about what I think is going to be and is already the big controversial topic for the next the ten years at least, and that's this question of evolution and morality or evolution and ethics.

One of the really interesting questions is where does our moral sense come from? We all have a strong moral sense, and there are certain moral sensibilities that you find almost universally throughout history, like the taboo on incest, for example, and the question is why do we have this moral sense?

And one of the arguments would be, well, this is because in evolution and evolutionary times, somehow we evolved certain types of moral sensibilities. So, for example, altruism of some kind might, in fact, make us more likely to survive.

You have to be a bit careful with this argument because when biologists talk about altruism, they use the word "altruism," but it has quite a technical meaning, namely that you as an organism do something that doesn't necessarily propagate your own genes. For example, it is like a bird that's in a flock that cries out when it sees a hawk. That doesn't propagate his own genes, but it does help everyone else to survive.

And you can show that this works in the animal kingdom with direct relatives, so in other words, if you die but your brothers and sisters survive, then your genes are more likely to be passed on for I think two brothers and eight cousins, I think it is. You can give up your life for eight cousins and then it works mathematically, and that explains some of this kind of behavior in the animal world. That’s a far cry from the altruism that we see in life.

I have no problems that that this is possibly where some aspects of our moral sensibilities come from, but the really interesting question that might be fun to discuss is why would this actually be truth tracking in any way. It would be a tremendous accident. Why would evolution be truth tracking? Probably the real question is if you believe in some kind of moral realism, if you think there really are moral facts about the world, like killing innocent people is wrong and that’s not something that we just socially constructed, it is very unclear that you could derive that, and I think a lot of philosophers agree you can’t derive that, in any straightforward way from naturalism. In fact, evolution makes it less likely for that to be true.

I think that’s potentially deeply problematic because a lot of people have a very strong intuitive sense that morals really are true, and that belief is particularly important in difficult situations. It’s one thing if you’re living in a nice, comfortable academic environment. You can say, well, you know, it’s all just socially constructed.

But you really want morality to work in difficult situations, in situations of famine and war, et cetera. I worry that by generating an alternative where we come from how we should live story about the origins of morality, then, given that we already live in a society with a cut flower morality—morality’s flower is cut from its origins and will eventually wilt, then the worry is that if you promote an alternative story, that could be tremendously destabilizing.

And I think the last thing I’ll talk about is science and the ultimate questions. I think a lot of the controversy that we see about science and faith is really a question about how do I obtain reliable knowledge about the world. And what we mean by that is this. We’re all philosophers and theologians in some way or the other. And so the science and faith debate is not going to go away because fundamentally it’s a debate about how do I obtain reliable knowledge about the world. How do I know that something is true? How

do I know that something is false? How do I know that something is reliable or unreliable?

Science is a very reliable way of obtaining knowledge about the world, but is science the only way to obtain reliable knowledge about the world, or are there other ways of obtaining reliable knowledge about the world?

And a moment's thought suggests that science, certainly natural science, is very unlikely to be the only way of obtaining reliable knowledge about the world. Think about things like relational knowledge. So, for example, you want to get married. A truly irrational thing to do would be to grab the first, the best girl on the street and say, "Please marry me," and if she says yes, that's even more irrational. Instead what we do is we get to know the person. We spend time with them. We ask the community around us what they think. You might even do compatibility tests, which my wife and I did, and which were quite revealing and interesting, but in the end of the day you don't marry someone because you both score 90% on the compatibility test. Also, one can't wait, and I didn't wait, for scientific certainty that Mary was the person that I wanted to marry or I would have waited forever. The reason I would have had to wait forever is not because she's not amazingly wonderful. It's because there are aspects of being married that are unavailable to me until I'm married. So there's knowledge that is based on commitment, and that knowledge is not available to me beforehand.

If I insist on an attitude or assumption of doubt, that I don't really know if she loves me until she proves that she loves me, the fact is that there will be evidence that will never be accessible to me precisely because I take that kind of, quote, unquote, scientific perspective. And so it seems pretty obvious if you think about it a little bit longer that something like the scientific method can't be the only way of obtaining reliable knowledge about the world, and instead there's lots of ways.

We all agree that there are good and bad ways of making choices for partners, and that the scientific method, repeated experiments in marriage, et cetera, are not necessarily the right way of going forward with that. We've learned as a society and instead we've got lots of ways of understanding how to make these kinds of decisions in life. So I actually think that the argument that science is the only way of obtaining reliable knowledge about the world is an odd one.

The last thing is just a comment on the kind of new atheist arguments which I see repeated quite often, as illustrated in this famous quote from Richard Dawkins, who has a great way of summarizing things. If you want to believe, he says, in teapots, unicorns or tooth fairies, Thor or Yahweh, the onus is on you to say why you believe in it. The onus is not on the rest of us to say why we do not. Now, what he’s really saying here is something about on whom the onus is. He says that the natural assumption is atheism. That’s where we should start, and you have to provide evidence for God before I have to try to even bother thinking about something like whether God exists.

Now, if I were to make a claim today that I discovered this new virus in my lab, you would be justified to be an “a-new virusist” until I gave you evidence of that. But the real question is what if this is a question about something like God, if for God you take the source of all being, sustainer of the world—you know classic theological ways of thinking about God—then it would seem very odd to think that I could think about God and discover knowledge about God in the same way I discover knowledge about a new virus in my lab. It’s just a completely different category.

And so what I think is happening in this argument and is happening again and again is that someone like Dawkins presupposes that there is no God and then uses that as a starting point to move on. And I don’t think that’s very helpful and I also don’t think that’s actually where the professional debate is.

To first order, the professional argument is one that says: the problem isn’t the evidence, but the problem is how we should weigh the evidence. And my argument is that the way the evidence should be weighed is that at the start you have a choice. You can either start with something like the brute fact of the physical world or you can start with the brute fact of a divine will and purpose behind the physical world.

And the argument that someone like Plantinga makes about Dawkins and that style of language is that Dawkins’ version of evidentialism presupposes no God before it makes its arguments and then asks whether there is or isn’t a God. I think that there is a much more fruitful way of engaging in this argument. It is not an argument that one side obviously wins over the other side. It’s a very fascinating and incredibly important argument for us as people and for society as a whole.

Ask yourselves: if I start from the assumption that there's nothing but materiality, where does that get me? How well does that explain things like fine tuning? How does that explain things like a whole set of what we might call signs of transcendence? How would it explain something like suffering? I can do that from both different starting points and the question then is, which of these two makes the most coherent sense of the world? That's really where the argument should be at.

KIRSTEN POWERS, FOX News: I'm curious as a Christian what you think about the Christians who do believe in the things like the Young Earth. I know some Christians who say, "Well, some people can believe in evolution and some people can not, and that's okay."

ARD LOUIS: I have a lot of sympathy for Christians who are skeptical about evolution because I think what they're skeptical about is evolution as a worldview, and they find it hard to disentangle that from evolution as a mechanism, and so that's where I think the key difficulty lies.

I think the average person in the pew is right in saying, "We should do something about this," but what they should have done is say, "You know what? Whether evolution as a mechanism is correct or true doesn't tell me whether theism is correct or God is there or not." What they did instead is that they tried to attack the science, thinking that if they could only undermine the science, then somehow the metaphysical problems would go away.

That trend has been unhelpful for Christians, and it's unhelpful for the way people perceive Christians. Certainly in the academy one of the big reasons why academics are skeptical about Christianity has to do with the fact that there are all these people that do not believe things that seem to them so obvious, like the fact that the earth is old. They think, how could any reasonable person not believe that? On the one hand I agree with the scientists. But I still have sympathy for the reasons Christians hold to views like a young earth.

The second thing is that there's another reason as well why Young Earth creation science is very popular among Evangelicals, and I think that has to do with the structure of protestant Evangelicalism which doesn't have a centralized body of any kind.

Everybody reads the Bible on their own and makes up their own minds. And that makes it difficult for Evangelical Christians to engage well with certain kinds of complex issues, like the relationship between evolution and science and faith. And the fact is that there aren't a lot of places where Evangelicals can spend their working lives thinking about these issues, which is what you need to do to properly assess them.

By contrast, if you look at the Catholic traditions, they've had a lot less difficulty with this, and been a lot more sophisticated on science and faith, and that's partially because there is something like a magisterium where these things get argued out among specialists for a long, long time before finally something like an encyclical comes out. There is no Evangelical magisterium on these kinds of issues. This leads to the "scandal of Evangelical mind."

KIRSTEN POWERS: Well, there's also this distrust of science by the Evangelicals I think for a good reason in a lot of ways. Is there a way to bridge that?

ARD LOUIS: I think one of the ways of bridging it is by example. So somebody like Francis Collins is incredibly important because he is clearly a real scientist and also a real Christian. For the average person who's not going to sit down and try to work through all the philosophical issues, what they really need is somebody they trust. I think it's also true that science often gets used to support all kinds of different views, and if it supports a view that you don't agree with, then it's natural to think something is wrong with the science. But a better approach might be to ask yourself whether the science does, in fact, tell you something about it.

FRANK FOER, *The New Republic*: How do you think about God? What is God's role? What is God?

ARD LOUIS: So some people would say God is something like a transcendent being who contains within himself the reason for his own existence or something like that. I think you're right in pointing out that the question of what is God is a really important question that lots of people have disagreed with each other about. We think of gods, in plural. We think that maybe there's a high God and there's multiple gods. I think traditionally Christians would say, and I think the Abrahamic faith would say that God is a transcendent being who would be personal or would be a person in some way. A

better way of saying it would be God is at least a person. I personally feel like the idea of God as a person is the most helpful way of thinking about the Abrahamic tradition of God.

Here’s another way of thinking about it. Why is there something rather than nothing? Right? So you could say, well, maybe the world has always been in existence, forever and ever and ever. The more you start thinking about it, the weirder that becomes because that means you have an infinite sequence of causes, and how can something be truly infinite?

So maybe then the world just popped into existence out of nothing. Well, that’s weird. I mean, there’s nothing that we have in our ordinary experience that has something pop in out of nothing. So maybe the word came into being by something, a mind, that somehow transcends our materiality.

And the fact is that each of those three options is very, very different and not intuitive no matter how you unpack it—it’s not like one of them is the scientific one and the other ones are nonscientific. None of them are scientific, but you’ve got to choose one of those three. And so when you think about God, God is must somehow be a necessary being who contains within himself the reason to be, right?

SHELBY COFFEY, Newseum: I just was interested in your unpacking a little bit what you mean in this instance by “person” and “transcendent.”

ARD LOUIS: Transcendent is really a complex word, but it really means something more than just the material world of physics. And so you could call that supernatural, and I think something like God must be supernatural. There are theologians who try to blur those categories, but I think saying the traditional God of our own faith is supernatural and transcendent means in some sense something outside of the ordinary cause and effect of physics as we perceive it.

“Person” again is a traditional theological concept, that God is somehow personal or that God is at least a person, and so you could think of God as a force, right, a yin and yang force, but I think God is something like a person, somebody who willed the creation into being. Christians would traditionally say that God also wants the good of creation.

SALLY QUINN, *The Washington Post*: Being a scientist, has that strengthened your faith or weakened your faith or is it the same?

ARD LOUIS: For me it strengthened my faith. I think that when I look at the way the world has been put together, I think it's amazing that something like the unreasonable effectiveness of mathematics would hold for the world, that we could peer so deeply into the structure of the universe, and to me that resonates. That's a sign of transcendence. That points to something outside of us.

We do live in a world where people question these things all the time, and so I think it's important if you're interested in these things, if you're intellectually driven as I am, or somebody that's typically motivated by intellectual things, then it is important that as you dig deeper into your subject. And it is gratifying if something about it shows you something about God, and certainly science has done that for me.

And I mean, I think at least 15 of my physics academic colleagues are active members of their churches, mainly Anglicans, and every single one of them, if you asked them has science strengthened your faith, they'd say, oh, yeah, they think it has, and sometimes for the reasons that I've given you.

MICHAEL CROMARTIE: Ard, if you can summarize the anthropic principle, and if it didn't hold, what would happen to the universe.

ARD LOUIS: The anthropic principle is basically a generalization of the idea that the universe is very finely tuned to allow life to exist as a whole. So you could imagine that the constants of nature could be such that they could show quite a range of values. Think about the external temperature that humans can live in. It can range quite a bit. You can find humans up in Antarctica. You find them in the Sahara Desert. They can range over quite a few degrees, but our own internal body temperatures really can only go up and down by a little bit, and we either die of fever or we die of hypothermia.

And so what actually happens is that the universe, rather than having this broad range of possibilities, seems to have a very, very narrow range of possibilities. So it looks like it has been fine tuned; in fact it looks a lot like it has been highly fine tuned for life.

Now, one way that you could explain this would be to say, well, you know, if it wasn't that way, we wouldn't be around, which is true. But then the counterargument would be to say the analogy is a little bit more like this. This is a famous argument from John Leslie, a Canadian philosopher, who said, well, imagine that you are put in front of a firing squad and there are 50 trained marksmen, and they all point and they shoot and everybody misses. Now, that's a little bit what it's like, the fact that the universe seems to be fertile for life because so many things seem to be just right. It's almost like every single one of them didn't quite hit you.

And in that firing squad argument you could say, well, you know, the fact is that they do executions all the time, and occasionally one sharpshooter misses. So occasionally all 50 of could them miss, and that's why I'm free. So I'm not going to worry about it.

I think most of us would think, why did that happen? Was there some kind of collusion going on? Was this a put up job? I think that's about as far as you can get with this interesting argument. I like to use the fine-tuning argument because in general there is a popular assumption that the scientific arguments somehow mitigate against faith, whereas, I think on balance they seem to be more suggestive of something like a divine purpose behind the world, but I don't think that by itself the unreasonable effectiveness of mathematics is conclusive one way or the other.

ANDREW FERGUSON, *The Weekly Standard*: I had a question about ID. Is it another one of these surface theories that Christians hold that is sort of unnecessary, you know, like Young Earth creationism? You really don't have to believe in that to reconcile it with the history of the universe. I mean, is it just a very high class version of that or is there actually something to it?

ARD LOUIS: Well, so the difficulty with it is partially in the word "intelligent design." Because almost all theists would believe that God intelligently designed the universe. So I talk about capital ID. I say this is Intelligent Design of the type that comes out of Discovery Institute.

I've been rather fascinated by why it has been so popular because it doesn't actually solve many theological problems like questions of what about Adam and Eve, and it makes some questions like theodicy questions worse. So questions about why is there

suffering in the world; you know, if God designed the bacterial flagellum, if God specially intervened in nature to design and make the bacterium flagella motor work, which is what makes E. coli more virulent and makes you more sick, then that just seems odd.

Although they would disagree with this assessment, I still think that fundamentally intelligent design is like a God of the gaps argument, which says that there's this gap, this thing we don't understand, and therefore we put God into it. On theological grounds I'm unhappy with that because I think that the traditional way of theistic way of thinking about what is science is that science is studying the ordinary ways that God sustains the world, and what ID is really saying is these ordinary ways that God sustains the world are not sufficient to generate something like biological complexity. So therefore, God had to do some kind of miracles in history, in natural history.

Leibniz said God doesn't do miracles for the wants of nature, but for wants of grace. That same argument applies to intelligent design, and given that it doesn't solve any theological problems or difficulties with interpretation of scripture and given that it has these other problems, these theological problems, I don't quite see why it's so interesting for Christian apologists.

I think it's popular because if you think about evolution as being a purposeless process, then this is a way of injecting theology or purpose back in. I just don't think it's the right way of doing it.

PETER BERGER, Boston University: I was thinking about if you compare Darwinists not in the sense of people who think Darwin was correct as a biologist, but as a philosophy of life. What they have in common with much of what happens in the Christian side, including intelligent design, is a belief in science, and a belief that science can be the ultimate arbiter of world views.

There are different ways of looking at the world, and the idea that from a Christian point of view one has to have a unified view of the views I think is a complete mistake, and that's sociological because science has achieved a status of privileged knowledge in the modern world for good reason, because science has been so successful in creating, making possible technology that has made all of our lives easier. So science has become a kind of magic key to everything, and it's a misunderstanding, and I think whether one

is a Christian or atheist, one can say science is a very useful way of looking at the world. It's not the only one.

DAVID CAMPBELL, University of Notre Dame: I was interested in your perspective on how evolution or the theory of organic evolution should be taught to adolescents who might be learning this for the first time in a biology classroom who themselves have a religious background.

ARD LOUIS: First of all I should say that we should not underestimate how smart young people are. I occasionally give talks like this to secondary school students, and often their questions are the toughest and the sharpest.

I think that not only science needs to be taught, but also something like a sociology or a philosophy of science or basic versions of it need to be taught to secondary school students at the same time, because the default option is that it often gets taught as if science is this privileged way of knowing and everything else is somehow irrational. That's the first step.

So it's really a broader question, how do we get to the truth. This is just one way. There are multiple ways, and once you realize that, then it kind of deflates the antagonism that people might feel toward any kind of new science that they're learning because it no longer is so obvious that the science is telling them who they are or how they should live.

So let's say somebody from an Evangelical Christian tradition, I'm sure from a Mormon tradition it must be the same, is that you say, it is God who tells us who we are and how we should live, and I think that's true of any theistic tradition. It's not science that tells us who we are and how we should live.

I think for secondary school students, to teach them about evolution you want to first of all try to rid your textbooks of potentially ideological statements, and actually sometimes there are ideological statements in secondary school textbooks, as much as possible.

I think the other thing that helps students tremendously is to see that there are examples of people who have thought differently. You could say: Well, if you want to think Christianity about this, read a little bit by Francis Collins. That’s his view. Here’s somebody else. That’s their view. Here’s somebody else. That’s their view.” And by showing that there are multiple views, I think it hugely deflates the kind of existential questions that students attach to the science. Then you can just teach them the science.

TIMOTHY DALRYMPLE, Patheos.com: This is an issue in the natural sciences, social sciences, and study of history. Do you feel that you have to bracket potential inferences to the supernatural?

Number two: there have been attempts to have a non-infinite universe and yet one that doesn’t have a beginning. The multiverse theory is another way of trying to account for the universe without it exactly having a beginning. And I was curious what you think or what’s the current state of thinking in the field on whether that’s been successful.

ARD LOUIS: The first question is really about what some people call methodological naturalism, and that’s the argument that when you do science, you shouldn’t assume that there aren’t going to be miracles in the lab essentially. That’s one way of thinking about that—that’s one way of parsing that out. So as a Christian, and I think this is going back to, in a simple way perhaps, the history of science, which is the development of the idea that the world would be regular, the idea that the world would be intelligible, and that the world would be uniform, by which I mean if I do an experiment in Oxford, somebody in Cambridge can get the same results.

So you can trace back some of these principles to deep theological principles of a God who sustains the world and sustains in a regular way. As a theist I believe God sustains the world, which means that if God were to stop sustaining the world it would not slowly grind to a halt, it would actually stop existing. That is, I think, the classic theological position.

In other words, when I study science, I study the ordinary ways that God sustains the universe, and I wouldn’t expect there to be miracles. So I would say that on theistic grounds I expect something like methodological naturalism to work. I don’t like that word because it actually has a lot of other connotations to it, but I expect, in fact, no

miracles in the lab because, following Leibniz, I don't think God does miracles for wants of nature.

So for that reason the way I do science as a Christian is virtually identical to the way I would do science if I didn't believe in God.

On the other hand, I think it's quite an interesting and daunting task for an atheist or a naturalist to derive from some kind of first principles why something like science would work. It's actually not that easy to do. It is easier to do if you start from a theistic point of view. One of my students is quite a serious Muslim. A few of them are quite convinced atheists, but when we sit around talking about science, none of this ever matters. This is one of the great things about science. Obviously when we start thinking about something like fine tuning where actually scientists by and large agree that that's there, the question what does that mean is a very different question, and there we disagree, but the reason we disagree is because of a series of other metaphysical presuppositions, not because we disagree on the science.

The difficulty I have a little bit was the rhetoric around methodological naturalism that has been used a lot by the ID community, and the difficulty I have with that is that it does in the end sound a little bit like wanting to smuggle some kind of miracles. So I'd rather do my philosophical inferences on things that we at least scientifically all agree on. That's a much cleaner thing to start from.

And so this is why something like the Intelligent Design movement, the Seattle based, Discovery Institute based movement, I don't think it's been that fruitful yet. I actually think fundamentally biology is far too young of a science to try to extract these kinds of philosophical inferences from. So let's say something like the fine tuning that I showed you in cosmology. The reason we can do that is because physics is simple. In physics I can calculate what happens if I change the constant. I can tell you what's going to happen.

Your second question was a no beginning question. I don't think that the no beginning universe theories have had a huge amount of traction, and this is partially because they end up getting huge problems with causality, and the multiverse theory doesn't actually solve the beginning problem either.

So one way of thinking about this is to say even the vacuum, the physical vacuum is full of things happening all the time. So think of the electrons and positrons I told you about before. They can spontaneously appear out of the vacuum and then disappear again. They appear and disappear all the time, and so when Hawking famously said, you know, "I have this theory that the universe can appear out of nothing," what he meant by nothing was actually the physical vacuum, which is a hugely structured, complicated thing.

And so the problem isn't can the universe pop out of the vacuum. Maybe it could; maybe it couldn't. That's a different question. The question is where did that vacuum come from and why is it so incredibly structured and who breathed the fire into the equations in the first place? It's just simply a question that science I think by definition can't answer.

TIMOTHY DALRYMPLE: Do the laws of science themselves need explanation?

ARD LOUIS: I think what's really interesting is that there are these laws. They're incredibly beautiful, and even something that we call the vacuum is hugely structured. So electrons and positrons which are matter, m , can appear out of E , energy. There's basically energy in the background of the universe, and matter can pop out of it and then pop back in. And that's something you might call nothing in ordinary language, but not really nothing. It's a hugely structured nothing, and the question is: where did those laws come from?

So all the questions about like what's the origin of the universe, they actually boil down to where do those laws come from, and the fact is those laws are incredibly structured and beautiful and intricate, and it would be very odd if they had always existed.

PAUL EDWARDS, *Deseret News*: So much of sacred history as recorded has these miraculous events. How does that fit into a scientist's thinking to talk directly about miracles?

ARD LOUIS: One of the ways of thinking about this is that if God sustains the world, then the ordinary ways he changes the world are the laws of nature that we study. The extraordinary ways would be what we call miracles.

Theologians have thought about this for a long time. Why does God do miracles? And this is again the Leibniz quote, which is God does miracles for want of grace. So God does miracles for redemptive purposes. We believe that God does miracles in the biblical history, which once you assume that there's something like God, it is not surprising that God could do miracles. Science has nothing to say about miracles really because by definition it studies regular things. It's something outside of science.

So that's maybe a short way of answering the question, but we need to look in the New Testament. In the popular culture, we only think of a miracle as a wonder. It's an amazing thing, like a magic thing. But in the Bible the word is always connected up to either a work of power or to a sign. There's always a purpose to these things, and that's an old theological concept that you see right through Scriptures, and I think that generates a pretty coherent story about why God does limited miracles.

PETER DAVID, *The Economist*: Can you imagine looking at the fine tuning and then going away and devising an experiment to prove the existence of the God that you infer from the sort of improbability of what you observe if there is no God?

ARD LOUIS: One possibility would be that somehow once we get the fundamental theory that combines gravity with the other three forces, then that will fix some of these constants that are free to move. That's the direction that physics is now going. And so we'd have to perform experiments as well as to see that we made the right choice for doing that, but let's say that we were able to do so. That would still not take away our wonder that once those forces, the constants were all fixed, they allowed something like life to occur. The only experiment I can think of would be to observe a whole bunch of universes and see that either there are many universes, first of all; so observe that there are many universes, and then by chance one of them might have life, one might be fine tuned for life, that would be one kind of experiment that you would do.

It still wouldn't disprove God. It would make the fine tuning argument less strong. But it's a hard thing. It's a little bit like saying the unreasonable factors of mathematics, could I devise an experiment to show why that is the case? And the answer is I don't think I can.

And so I think what Peter Berger and I were saying is that there are certain types of truth or knowledge that are not necessarily accessible to the scientific method as we're used to using it, no matter how hard we try.

PETER DAVID: My problem is that if you enter this debate as a physicist, you're sort of laying claim to the rigor of mathematics and physics as part of your explication for the existence of God, but in effect what you're saying it seems to me is not that different from what millions of people have done for millennia, which is just look at the world around us and admire its complexity and its beauty and infer the existence of God.

There's nothing kind of in the mathematics that I understand that you've shown us that sort of, you know, drives you to a different conclusion. So why should we privilege your observation because you're a physicist?

ARD LOUIS: I think you're right in saying that I should not be privileged with essentially a philosophical topic as a physicist. Neither should an atheist be privileged because they're a scientist. In practice the reason why people like listening to me is because there's a kind of an indirect sense out there that the atheists are allowed to privilege science. Science and atheism come together.

And my argument would be, no, that's not true. Neither is it true that the fact that I'm a scientist makes me necessarily better at adjudicating this.

Maybe one of the points I am trying to get at is to say that science itself doesn't tell us that there is no God and it doesn't tell us that there is a God. It doesn't mean it's completely neutral. So really this is a philosophical question,

MICHEAL FLAHERTY, Walden Media: There is that iron bound approach that Dawkins has which is, "Here is reality. Don't question any more of it. Just listen to what I say." And I was wondering, what is the overall reaction to the fact that the one thing that makes science fun is that whole idea of being curious and asking questions, he doesn't seem to be so open to all of that.

ARD LOUIS: I think we have an ambivalent view of someone like Dawkins. I think the tide is turning a little bit and the people are tired of all this anti-religion rhetoric, and I think they recognize that if you make science and atheism seem to be connected, then

people that don't hold to atheistic points of view might start distrusting science. I think that has happened in the United States on a large scale, and I think that's fundamentally dangerous for science.

KAREN TUMULTY, *The Washington Post*: I wonder if there's anything within science that would reinforce theology in where we're going in terms of an afterlife or if there is some part of an organism that doesn't die when the rest of it does. Is that just truly a leap of faith?

ARD LOUIS: That's a good question that I haven't thought about so much. Maybe I'll take one little caveat to how you framed the question, which is that part of what I'm trying to argue is that science, certainly natural science in and of itself doesn't tell us a lot about theology either way. So whether it can tell us something about the afterlife, my guess is almost by definition not because certainly the Christian tradition of the afterlife is that something's nonmaterial, and that by definition science doesn't deal with that.

FRED BARNES, *The Weekly Standard*: Earlier you mentioned marriage from this reliable knowledge that you've learned. Can you elaborate more on these truths? What is the nature of them? Are they lesser or greater truths?

ARD LOUIS: That's a nice analogy between the idea when you get married there are things that you learn about what it is to be married that you just can't learn unless you make a commitment. So some knowledge is related to commitment. And Christians would say the same is true of Christianity. There are aspects of knowing God that are not accessible to you until you make a commitment of some kind towards God. And I don't think there's a lesser truth in any kind of way. It just says that some kinds of knowledge can only be accessed upon making a commitment of some kind. That's an old theological tradition.

To the argument that science is the only way of obtaining reliable knowledge. You know, science is a great and glorious enterprise, to use the words of Peter Medawar, the greatest, I think, humans have ever engaged in. It is like a bright light, and it shines very brightly. If you say that the only place where we can look for the keys is under this lamp

and that if the keys aren't under the lamp, therefore, they doesn't exist, then that is like saying that science is the only path to knowledge.

SHELBY COFFEY: Can you speculate on what is not God in your view?

ARD LOUIS: I think creation is not God, and so in some sense we are other than God. So creation is not God. God may sustain, but we are not gods. We are the creation of God's. That would be a classic theological point. I think I would say that, you know, by definition we are not God. Creation is other than God, although it obviously depends for its sustenance on God and was created by God.

DOYLE McMANUS, *Los Angeles Times*: If a statistician took the number of possible universes at ten to the 500th, what would the probability be that in at least one of those in the firing squad would miss? Which is it?

ARD LOUIS: That's actually a very deep and profound question. It has less to do with statistics. It has more to do with our ability to calculate the properties of this universe. Here's a simple counter-example. If you have an infinite number of odd numbers, none of them have the property of evenness. So even if you have an infinite number of universes, it's not at all the case that therefore some of them would allow life. So the problem with all of the universes is the question. You can have an infinite number of them. You know, what kind of infinity are there? So the problem isn't statistics, but the problem is how you count. If you were to make a theory of infinite number of universes and then you could ask yourself even if you do have them, why is there one that allows life if there turned out to be just one? And where did they come from in the first place? If you could show that there are many universes and that there's some kind of stochastic distribution of constants and that there's a finite number in the regime that allows life—it's a question that just is basically speculation and probably will remain speculation forever even though it's fun to think about.

ALLISON POND, *Deseret News*: I was hoping you could comment a little bit on your work with the BioLogos Foundation and some of the conversations that you have with pastors and others about these issues, and maybe what are the prospects for reconciliation between some of these groups.

ARD LOUIS: The BioLogos Foundation is a foundation that Francis Collins founded which is aimed at helping Evangelical Christians think in a more fruitful way about evolution. My experience is that the average Evangelical doesn't want to be in an anti-science camp. They don't want to be the group that is against science, but they may feel forced to do so for all kinds of reasons that we discussed earlier.

On the other hand, experience tells us that all these kinds of things take a very long time. So by analogy we can look at something like the idea that the Earth was not the center of the universe, the Copernican revolution, which nowadays none of us find to be problematic at all. We think of course the Earth is not the center of the universe. But back in the day that was a big controversy, and one of the reasons it was a big controversy was because the church had picked up a kind of Aristotelian cosmology, which talks about the earthly sphere and the heavenly sphere and the Earth needs to be at the center for that.

And in fact, if you think about it, if Jesus ascended up into heaven, where did he go then if the Earth was not in the center of the universe? And where is hell then if it's not in the center of the Earth?

So all of those kinds of concepts were the issues that people struggled with, which now in retrospect we think, well, those were actually silly. They were not silly, but those are not issues that we currently find to be very difficult. And I hope that this question of evolution will one day be looked in that same way. But experience tells me that that might take a long time. In BioLogos we've had quite a bit of friction with some Evangelical groups who have called us heretics, and I think it's going to be a while before that gets sorted out.

I think that on a pragmatic level what's important is that we can show the young Evangelical students who are about to go to college that their faith doesn't stand or fall on whether the earth is 10,000 years old. That's what I really want. I think what it will achieve in the shorter term is that they'll at least see that there are other models to consider. But whether the church as a whole will find that easier or harder to, I don't know.

THE FAITHANGLEFORUM

ABRIDGED TRANSCRIPT

“Current Controversies in the Religion & Science Debates”

Dr. Ard Louis ♦ November 2011

MR. CROMARTIE: I just want to say to Professor Berger and Professor Campbell and Professor Louis, we’re so grateful, for the time you took, the work you put into your presentations. It has been extremely helpful, enriching, and we’re very grateful.

♦ END ♦

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