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The Language of God | Francis Collins

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The Veritas Forum

In this episode we hear from the physician-geneticist who led the human genome project, Dr. Francis Collins. This evening, September 24th at 7pm Eastern, Dr. Collins will be awarded and honored by the Templeton Foundation in a ceremony that includes theologian N.T. Wright. The event is open to all through a virtual link you can access by visiting www.templeton.org. • Dr. Collins is the current director of the National Institutes of Health and author of several books including The Language of God. In this episode he discusses his journey in science and faith while also exploring the beauty of our genetics. ••• Please like, share, subscribe to, and review this podcast. Thank you!

Transcript

Welcome to the Veritas Forum. This is the Veritaas Forum Podcast. A place where ideas and beliefs converge.

What I'm really going to be watching is which one has the resources in their worldview to be tolerant, respectful and humble toward the people they disagree with. How do we know whether the lives that we're living are meaningful? If energy, light, gravity and consciousness are a mystery, don't be surprised if you're going to get an element of this involved. Today, we hear from the physician-geneticiist who is a very passionate person.

Dr. Francis Collins. This evening, September 24th at 7pm Eastern, Dr. Collins will be awarded and honored by the Templeton Foundation in a ceremony that includes the allogen N.T. Wright. The event is open to all through a virtual link you can access by visiting www.templeton.org. A link will also be available in the description of this episode.

Dr. Collins is the current director of the National Institutes of Health and author of several books including The Language of God. In this episode, he discusses his journey in science and faith while also exploring the beauty of our genetics. From the stage at Tulane University.

So I am a scientist, but I'm also a believer in God. And I wanted to tell you about my own

pathway of how it is that I have come to the conclusion that those worldviews are not only common, but I have come to the conclusion that those worldviews are not only common. They are wonderfully complimentary.

And despite the fact that you may be hearing voices coming from various extreme positions, arguing that you can't have both of those worldviews coexist together. I'm here to say they can and they should. And that in fact this battle that seems to be raging right now between naturalistic views that all you have is all the material aspects of the universe.

Versus those who find that to be unsatisfying and even to say that science isn't to be trusted. That battle is not a necessary one. We have an opportunity because we humans started that battle to perhaps see whether we might be able to end it.

And what I hope to talk to you about this evening is a bit of my own pathway because I think I deserve, are you deserve to hear something about my personal perspectives. And I thought I would start by telling you something about the science that I work on, which is the area of genomics. Again, it's a great pleasure to be here and I want to thank the students that have worked hard in planning for this evening and for the follow-ups that you heard about.

And I hope those of you who are interested in continuing the discussion beyond tonight will take advantage of that. And that perhaps this will be the kind of conversation that takes on a longer life. Because we are here this evening asking some of the most important questions that humans ever get to ask.

Is there a God? Does that God care about me? What happens after I die? What's the meaning of life? Those are the kinds of things we're here to consider. I think if you contemplate those questions for a minute you'll realize that science might be able to help you a little bit but it sure isn't going to get you the whole way there. And hence the need for some integration of the scientific strategy and the spiritual strategy.

Well, science has certainly been making great strides. And I wonder if there's any way to take a little bit of the light off the screen so that the images can be seen a little better. That would be helpful if it's possible to do that.

Here is a cover of Time Magazine published at the time that the Human Genome Project was reaching its conclusion and showing the familiar double helixes on either side but also showing a couple of figures that clearly intended to represent Adam and Eve. So when the media talks about genomics they often seem to also raise this question how this fits together with spiritual perspectives. I could show you many covers that have featured genomics or genetics or DNA and they virtually always have two things, the double helix and naked people.

And I think there's a good reason for that that editors have figured out that double helixes don't sell magazines. So what's the story? What's all the excitement about? Some of you in this room work in this field and for all of you this is very familiar stuff and you're probably just as excited as I am about the phase that we're in where we're unraveling the mysteries of DNA at a great rate. But a lot of the excitement is because of the time we've arrived at it.

But I think we ought to spend a minute here talking about what this molecule is. So here's a diagram of DNA spilling out of the nucleus of the cell. You can see the double helix here and here it's sort of unwound in this cartoon version so that you can see the way in which it conveys information.

This is the information molecule of all living things, a remarkable way of storing information. And the way it does is by the series of these chemical bases here abbreviated ACGNT. And the series of those letters has to be the instruction book for an organism.

And we call that the genome of that organism. If you didn't already know the answer, I would challenge you to guess how many of those letters in this simple four-letter alphabet it would take to specify the biological properties of a human being. And I guess you would have to wrestle with that one a bit when you think about how complicated we are.

And this instruction book has to be able to provide information to enable you to go from being a single cell to what you now are. Obviously a very complicated organism with about 300 trillion cells, each of which carries this instruction book but uses it in different ways. Well, the answer is about 3.1 billion of those letters.

That's a big number. Although in Washington, D.C., where I come from, it doesn't seem to be a big number anymore. But that's another story for another talk.

Thank you. So the big news of the last 15 years is that we have actually got our minds around them. What this molecule might look like if we had it in detail in front of us.

And we do. And basically the Human Genome Project, which I had the privilege of leading, I hope this battery isn't going in. I got started in 1990 as a bold audacious effort to read out all those 3 billion letters and to place them in the public domain where anybody with a good idea could begin to try to help us understand how to apply that for medical benefit.

This was a project which was not exactly embraced at the outset by everybody. In fact, the scientific community was largely opposed to this when it was first put forward as a project that might just not be achievable because we didn't know how to do it. In 1990 we had to invent the technology as we went along.

But fortunately, a lot of the best and brightest of the current generation of scientists decided to get involved in this. And those problems little by little began to yield to the ingenuity and creativity of those talented folks. And various countries got together and decided that they could do this as a team.

And it was my job from 1993 until this past August to serve as the project manager of this enterprise and to make sure that we made progress and that we produced data of high quality and that we gave it all away. And that's what we did every 24 hours making sure that there was no delay in the utilization of this for human benefit. And interestingly, 50 years to the month after Watson and Crick initially described the double helix in April 1953, 50 years later, we finished the job of reading out those letters two and a half years earlier than expected.

And you'll be glad to know his taxpayers about $400 million less than we originally expected to spend on this. Can you believe that? So that was a milestone. I think people will look back in several hundred years when they try to figure out what were the significant things that happened about this time and the Human Genome Project will be on that list.

We only have to do this once and it's essentially done. Well, it's done in the sense that we have the letters, but now we have to figure out what to do with that. So for me as a physician, that was a critical step.

It was exciting. It was an incredible experience to work with 2500 scientists from six countries to make this all come true. But now the really important stuff can happen, which is the medical applications.

And those have been coming along for various diseases at various speeds. So here's the way that this is going to play out in terms of medical consequences. Every disease now has the chance to benefit from our understanding of human DNA by moving from the top of this diagram to the bottom.

So that's time. I haven't labeled the axis because the rate of progress is going to be different for various diseases and will depend a lot on how much effort the medical research enterprise is allowed to put into it. And of course, that means support is needed and I'm hoping to see that support get better because it's been a tough five years for medical research.

Every disease has a genetic component. I challenge you to come up with a condition that doesn't have some hereditary contribution, whether it's diabetes or heart disease or cancer or even things that you think are not genetic, like infectious diseases. Well, you know what? Your genes have some role to play when you get exposed to an agent that causes an infection in terms of whether you fight an offer.

So every disease has a genetic component. And the Human Genome Project allows us now at a prodigious rate to uncover what many of those are right down to the specific DNA sequence that mediates that susceptibility. Now, once you've discovered those, and we've discovered about 800 of them in the last three years, you have a chance to begin to practice some sort of preventive medicine so that each of us would have a chance of knowing what we're at risk for and then adjusting our plan for prevention by diet, lifestyle, exercise, and maybe even pharmacology in order to reduce the risk and have a better chance of staying healthy.

And that's called personalized medicine, and that's pretty exciting as a concept because it gets you away from the one size fits all approach, which we all would agree hasn't necessarily been as successful as you would like. More than that, we have the chance to use that same kind of information to figure out how to do a better job of prescribing drugs. If 100 people come down with a particular disease and are probably diagnosed and are given the treatment of choice, many of them will get better.

Some of them won't, and some of them might even have a toxic side effect of some sort. A lot of that difference is because of genetic variation. While we are all 99.6% identical at the DNA level, that 0.4% is still a lot of DNA, and it may make a difference in terms of your response to a therapy.

Pharmacogenomics aims to sort that out and therefore do a better job of picking the right drug at the right dose at the right time for the right person. Perhaps the longest term consequences of all these discoveries in the genome are going to be in therapeutics because that is a very long process to go from an insight about the cause of a disease, which the study of the genome is giving us, to actually having a drug that FDA has proved to be used in clinical practice. But that will revolutionize therapeutics.

So in another 10 to 15 years, the way in which medicine is handled therapeutically will be radically different, but it's going to be sooner than that for some of these other aspects. So we are on the cost, I think it's fair to say, of a genuine revolution in medicine that has been spurred on by these basic discoveries about our own DNA instruction book and how each of us carries a certain series of glitches that place us at risk. So if you thought you were the perfect genetic specimen, I'm sorry to tell you that you aren't.

And that we have a chance, if we're interested, to take advantage of that knowledge and focus on staying healthy. And the spin-offs of that are really exciting. So that's my medical story, that's my science story, but look at these two images for a minute and let's talk about whether there's something there that provokes you in the next part of this conversation.

To consider whether these world views represented here on the left by a rose window from Westminster Cathedral and on the right by DNA in a different kind of view, looking down the long axis of it. I guess the reason I put this up is to ask the question, do these

two world views, one spiritual and one scientific, have the opportunity to coexist, or do you have to choose one or the other? And I've told you about my scientific worldview, and now I want to tell you something about my spiritual worldview and how that came to be. I was not raised in a family where faith was considered very important.

My parents were wonderfully unconventional. They did the '60s thing except it was the '40s. [laughter] After various careers had been tried, they bought a small dirt farm in the Shenandoah Valley, Virginia with no plumbing, and decided to live off the land.

And that didn't work out so well. And so my dad went back to teaching, and my mother began writing plays. And I grew up in a home where music and literature and the arts were greatly valued.

And my mother homeschooled me until the sixth grade, which was also not done at that point, but she did it. There were no lesson plans as far as I could recall. It was pretty chaotic, but it was a wonderful opportunity to get excited about learning stuff, because she was very good at conveying that joy.

And so I learned a lot of stuff, but I didn't learn about faith. It was not denigrated at my house. It just wasn't considered very important.

So when I got to college and those conversations late at night in the dorm began to occur where people were challenging each other about what do you believe and why do you believe it? I'm sure that happens right here at Tulane all the time. I didn't have any answers, and I kind of decided I felt like I sided with the people who said, "There's nothing worth believing in. That was all superstition.

We are here at the university. We are going to rise above this." And so I probably at that point was an agnostic, although I don't know if I knew the word at that point, but I certainly wasn't a believer. Then I went on to graduate school, as you heard, in physical chemistry, and there, as I immersed myself more deeply in the study of how atoms and molecules are put together, I became very much a reductionist and a materialist.

And I concluded there was really nothing worth counting on, except for the principles of physics and chemistry, and then second order differential equations were the closest thing to truth that was possible for the human mind to absorb, and I became an atheist. Now I never really considered whether there might be some evidence to support the alternative view. I basically slipped into atheism because I felt that was probably what a lot of the people around me must believe, although we didn't talk about it much.

And it was also kind of convenient, because it meant I didn't have to be responsible beyond myself. Then I had a change of heart and my professional interests, because I discovered I had kind of missed out on the fact that biology was undergoing a bit of an exciting transition from a descriptive science to a principle-based, exciting digital sort of

field because of DNA and RNA and protein and all that stuff. Recomminent DNA was being invented, the genetic code had been sorted out a few years earlier.

I missed all of that. And the more I immersed myself into it, the more exciting it seemed to be. And so I decided to change fields and not knowing quite how to do that to keep as many options open as possible.

I decided to go to medical school. Now why do they let me in to the University of North Carolina with that story of motivation is still a mystery, but they decided I was worth taking our risk on. And so there I was turning up as a brand new medical student.

And here was the guy who hated to memorize stuff. What was I doing there? But it was wonderful. It was from the first day, this sense of having found the career that probably you've been called to all along.

I just didn't realize it. So I loved the science of that. And then the third year medical school happened and it wasn't just science anymore.

I was sitting at the bedside of people with terrible diseases. Many of them, one, beautiful people who didn't deserve what was happening to them. And I knew that our medical care system was not going to solve a lot of their problems because they had far advanced diseases for which our various interventions had essentially run out of options.

And I noticed, I couldn't help but notice how many of these people seem to rely upon their faith as the source of support. It wasn't our medical care, it was their faith. And even as I imagined myself in their position being angry and fearful, they seemed many of them at peace.

And that was puzzling. And I assumed that must be some psychological consequence of some sort, but it was certainly powerful. And then one afternoon, as I sat at the bedside of an elderly woman who had very severe heart disease, who had daily episodes of crushing chest pain that we didn't manage very effectively.

She, in a very personal way, told me about her faith and how that gave her strength to face what was coming because she knew she had little time left. And she then turned to me after sharing that and looked me intently and somewhat quizzically and said, "You know, doctor, I've told you about my faith and you haven't said anything. What do you believe, doctor?" What a simple question.

What do you believe? And yet, it was sort of the first time anybody really asked me the question in such a direct, sincere way. And it wasn't an intellectual game, not this time. This wasn't like being in the dorm where you're throwing around ideas and trying to show that you're smart.

This was a direct, simple question. What do you believe, doctor? And the color rose in my

face and I felt this intense, disquiet and the desire to get away as quick as I could. And it stammered something like, "Well, I don't really know." She looked at me very surprised.

You don't know enough. Well, that haunted me for the next day or two because I hadn't expected it to be so upsetting. And I wondered, "What happened there?" I tried to say, "Well, it was just because I didn't want to be impolite." And tell her I thought it was just all a bunch of superstition.

But it was more than that. I realized I wasn't quite sure what I believed. And then the answer hit me what my problem was.

I was a scientist. I was supposed to make decisions based on considering the evidence. And I, here facing the most important question of all, is there a God that never considered the evidence? I just assumed there wasn't any.

But I noticed around me there in that medical school, there were some professors who were believers. They didn't make a big deal about it, but it was pretty clear that that was where their heart was. And I kind of assumed that maybe they were people who had learned about faith as children and never quite gotten over it, but it did seem like if it was really all just a bunch of superstition, they would have gotten over it.

So what was that about? So I decided I better learn about what faith was so that I could answer that question the next time more confidently, saying, "Okay, I'll tell you what I believe. I don't believe any of it, and here's why." So I began reading the world's religions by picking out some of the texts of Christianity and Judaism of Islam. And I found it very tough going.

I had no idea where to start. I didn't understand what I was reading. There was no Wikipedia to help me.

So in frustration, I knocked on the door of a Methodist minister who lived down the street from me who seemed like a reasonable fellow and said, "I need to talk to you about this faith thing. Have you got a minute?" And he graciously invited me into his study and listened to my blasphemous questions. And they were.

And then took a little book off his shelf and said, "You know, I think you might benefit from reading this. It was written by a fellow who was a scholar, who was an atheist, who saw around him other people who were believers, who didn't quite understand how they could possibly accept such things and set about to try to figure out what the rational basis might be for belief. And he wrote about it in this little book, and his pathway might illuminate yours.

I thought, "Well, okay, fine." I took the book home and I sat down and looked at the cover and I thought, "Well, this doesn't sound too threatening. It's a book with a word "mere" at the front. They're saying "mere Christianity." It sounds like it's maybe a put

down.

That's what I'm looking for. [laughter] I kind of didn't get that one right did I? Well, so those of you who are interested will get copies this evening of that very book by C.S. Lewis, "mere Christianity." Written some 60 years ago, and just as fresh today's it was when he wrote it, actually when he spoke it as a series of radio broadcasts during World War II. And as I opened that book and began to read the pages, I realized I was into territory, I didn't know existed, and that here was a profoundly deep intellect who was arguing the case for belief on the basis of reason.

I had thought faith was over here and reason was over there. And here he was putting them together and doing so in a very compelling way. And within a few pages I realized that my arguments against faith were those of a schoolboy and that I had a complete need to reconsider the stance that I had taken for the preceding 20 years.

Well, that was pretty upsetting. It wasn't the answer I was expecting, and I did not exactly embrace that right away. I put that book down so many times, devouring that I wasn't going to go on and then got pulled back to it.

And ultimately I began to see that there was not only logic from the perspective that he put forward from philosophy, there was also logic from science itself. The very science that I had studied in many ways contained pointers, not proofs, nothing I will tell you this evening could be constituted as a proof of God's existence, but pointers, they were pretty interesting, and they'd been right in front of me, and I'd missed them. So what were some of those pointers? Well, first of all, this may seem trivial, but in many ways it's rather profound.

There is something instead of nothing. And apparently there was once nothing. There is this phrase that Wigler, the physicist coined, called the unreasonable effectiveness of mathematics, and boy did that resonate with me.

Mathematics is the way in which we describe the behavior of matter and energy of how the universe works. Gravity is a perfect, beautiful, inverse square law. The Maxwell's equations have described electromagnetism.

The Schrodinger equation, which I had spent those years as a graduate student trying to figure out how to solve a simple second order differential equation, equals MC squared. All of these amazing mathematical formulations which are not only simple, but actually they're quite beautiful. And why should the universe behave that way? I have never thought about that.

The Big Bang itself, the fact that the universe had a beginning, that it came out of nothingness in this amazing singularity, and then has been flying apart ever since, with all those galaxies flying away from us that we measure by the redshift and back

calculate that the universe must have started about 13.7 billion years ago. Nature has not been observed to create itself. So how did this whole thing get started? That cries out for a creator, doesn't it? And the creator would have to be in some way outside of nature and outside of space and time.

Otherwise you haven't solved the problem of a first cause, because if God is limited by time, then you're required to come up with a solution of what or who created God. So the solution to the beginnings question allows you, in fact forces you, to postulate a supernatural force that is capable of creation, and is not limited by space and time, and apparently who's a pretty good mathematician. And also it seems an incredibly good physicist, because the other thing that I was totally unaware of, but began to learn about, is the way in which the universe has been fine-tuned to make complexity possible, and you can't have life without complexity.

You can have all kinds of interesting life forms that we could imagine, and they wouldn't have to look like us. But I don't think you'd come up with a way to have life without some sort of complexity. And the way in which our universe has its constants fine-tuned in an incredibly narrow zone to make such things possible is breathtaking.

Let me just give you one example, the gravitational constant. Now mind you, you cannot derive by theoretical means what the value of the gravitational constant is. It just is what it is.

You measure it. Suppose it was a little different. It would still be an inverse square law, but suppose it was slightly stronger or slightly weaker.

Well, Timpler and Barrow did those calculations, and were rather astounded by the result. If gravity was one part in 10 billion stronger than it is, then after the Big Bang, as everything is flying apart, gravity would be strong enough to bring things together, and yes, you would start to have coalescences of galaxies and stars and planets, but they'd come together a little too soon. And the Big Bang would lead to expansion, but then ultimately contraction, and there would be a big crunch along before it and hot.

And we wouldn't be here. If gravity was just a tiny bit weaker, again, one part in about a billion, then things would keep flying apart without the necessary gravitational pull to result in galaxies forming at all. And so we would have an infinitely expanding universe with no possibilities, complexities, just simple particles.

That's one of 15 constants, and they all have this property that they're tuned in just the way to make this conversation possible. Now, maybe theory will someday come up with a way to predict that they had to have these values, but I don't know very many physicists who think that's likely. Or maybe it will turn out that they're constrained in some way so that they have to have some ratio between them, but the idea that these are completely required doesn't seem to be very plausible.

So you're forced when you look at that, to marvel at it, and to say, well, there are a lot of possibilities here. Again, one might be that we're just not clever enough yet to figure out that they had to be this way for some theoretical reason. That seems unlikely.

A second way would be to say, well, the only way to solve this improbability is to say there must be a very large number of other universes out there that have different values in these constants. And we, of course, because we're here, have to live in the universe that got it right. We won the lottery.

But that would require, in order for this probability calculation to make much sense, that there would be a very large number of parallel universes that we could never observe. And must therefore be an article of a certain degree of faith. Or the third possibility is, this was all intentional, that these constants have the value they have because some intelligence calculated that that was the way to have an interesting universe, and not a sterile universe that would go on indefinitely with no possibility of life.

Well, I ask you, which of those possibilities seems to be the most reasonable, especially when put together with these others. Now, the final argument, because now I've gotten you to the point, perhaps, of accepting some plausibility of a God that cared about complexity, but does God care about us? Well, here comes the moral law. And this is the first chapter of that book, near Christianity.

The first chapter is entitled Right and Wrong, as a clue to the meaning of the universe. Wow, that was pretty grandiose. I thought, where is he going with this? Well, he's going right to this question, under moral law.

One which is fascinated and vexed philosophers for long periods of time, and vexes us today. And what I'm talking about here is the universal sense that we humans have of right and wrong. It seems to have been there in all cultures down through history, across the world.

We are heavily influenced by our culture in terms of what we decide to put in the column called Right, and what we put in the column called Wrong, but we don't disagree that there is such a thing as Right and Wrong, and that we are called to do the right thing. And when we do the wrong thing, which we regularly do, and get caught at it, we don't say, well, I don't believe in the moral law. We make an excuse, don't we? To try to say, well, it wasn't really the wrong thing, which only proves that we are under the moral law after all.

So it's there. You don't even think about it. It is a regular part of your life, and it cries out for an explanation.

So, what might that explanation be? Well, certainly the sociologists, the evolutionary psychologists would argue that we can explain this on the basis of evolutionary pressure.

That having an idea of Right and Wrong has turned out to be a good thing for the survival of humanity. And of course, evolution cares about reproductive fitness, so it would have to say that those who have the moral law have been more reproductively successful, otherwise this isn't going to work.

So how could that be? Well, you can see some glitters of this. If you're going to be, for instance, generous to your own family members, they share your DNA. So in a certain way, you are improving the chances of evolution favoring your DNA because it's also theirs.

If you're going to be nice to somebody who's going to be maybe nice to you next week, when you need it, then that reciprocal altruism, as it's called, could also be seen as an evolutionary benefit. If you were going to behave in that fashion. Martin Nowak and Harvard has even come up with models using computer versions of the prisoners dilemma, which would argue that entire groups could be motivated by evolutionary pressures to be nice to each other in order to help the group survive.

But that model and all of the models that I know about require you to be hostile to people who are not part of your group, otherwise the whole thing falls apart. Well, is that really what we observe as part of this moral law that we have all inherited? I'm not sure that does it. What about mother Teresa? Reaching out to those who are dying in the streets of Calcutta, people she's never met, certainly not of her own natural group.

What about Oscar Schindler, who saved all those Jews from the Holocaust, people he didn't know? What about the Good Samaritan? Or what about this guy? Wesley Autry. Wesley Autry was standing on the subway platform in New York City. Standing next to him was a graduate student.

The student had an epileptic seizure and to the horror of everybody standing there fell onto the tracks as a train was approaching. With very little time, Wesley leaped onto the tracks, moved the still seizing young man into a position between the two tracks covered in with his own body as the train rolled over them. Miraculously, they both survived.

There was just enough room there for their two bodies not to be crushed by the train. And here is Wesley the next day with the student's father describing the experience. Wesley's black, the student's white, they never met each other, they probably never would.

And New York City went wild about this whole experience, marbled at. People pointing to this as an example of human nobility, of what we really should do, but we often don't. And don't you resonate with that? This radical altruism? Well that was a scandal to evolution.

Wesley blew it. He put his reproductive fitness at tremendous risk. Before a young man

he didn't know, who was having a seizure.

Evolution would certainly not approve of this. Now don't get me wrong, I don't want to present this either as a proof, but it does make you wonder if God was trying to reach out to us. In some way, to provide an indication that God was not just a deist God who created an amazing universe, but really wanted to have relationship with one particular species, a species made in God's image.

Wouldn't this be an interesting way to find that evidence? Written into your heart and mind, this knowledge of something called right and something called wrong, and this urge to try to do the right thing as an indication of the character of that creator God who must therefore be good and holy. That's the argument I read for the first time in Lewis. It's an argument that resonates with me today.

And it's an argument which others have put forward. Emmanuel Kant, the philosopher of this famous phrase, which very much resonates with what I just said, two things fill me with constantly increasing admiration and awe. The longer and more earnestly I reflect on them, the starry heavens without the moral law within.

And I still am filled with awe as I consider those. Well, this took about a year to get through these various arguments and come to the point of realizing that the idea of atheism was no longer palatable, that it was the least defensible of all the options, and that in fact the existence of a God who cared about human beings was a pretty compelling argument to face up to. And then I had to consider what faith might this be for me? What was the nature of God? And now I went back to reading those texts trying to understand what they meant, and I was somewhat better positioned to understand some of their points, and I could see now that the world's religions in fact have a great deal in common, and that was gratifying to see.

And we should keep remembering that at a point where people seem to portray these religions as somehow being drastically and alterably different from each other, but they do have, after all, special features. Now, this was at the point where I was beginning to sink into a deep sense of trouble because I had come to the perspective that there was this thing called the moral law, and I began to realize that it was a pointer to God who must therefore be perfect and good and holy, and I knew I was not. And the more I thought about it, the more I realized how far short I felt of what the moral law that God had given me was asking me to do.

And just as God was beginning to come into view, I was receding because of my own inadequacies, and that was deeply troubling. And I encountered the person of Jesus Christ, a person well documented by history to have walked this earth extremely well documented also to have died on the cross, and remarkably, from many perspectives, and read empty rights books, if you want to read about those, a great deal of strong evidence to say, "Incredibly, this person runs from the dead," and claimed to be God, not

just to know about God, but to be God. And suddenly, the words that I had heard from other Christians and thought were so much gibberish about Christ dying for your sins, and how through Christ you can have relationship with God, suddenly it all made sense, because I felt that breach, and now I saw what the solution might be.

And so after this two-year effort to try to find what might be the truth, on a beautiful fall day hiking in the Cascade Mountains of the northwest of this country, with my mind cleared of all those distractions, it's so easy to get in our way when we're trying to find the truth. I realized I no longer wanted to resist, and I gave in, and I became a follower of Jesus. That was 31 years ago.

Now I recognize as I tell this, it's a very personal story, and each person has to find their own path through that. I am incredibly grateful that I was given the chance to do that exploration and find those answers, and I would certainly encourage all of you to do the same if you haven't had the opportunity. And maybe I shouldn't have been so surprised about the fact that faith and reason were compatible, because here we are when I looked at the definition of faith in Hebrews in the New Testament.

Now faith is a substance of things hoped for, the evidence of things not seen, evidence right there in the very definition. Okay, so here I am, I'm 27, I've become a believer, but I'm also already into this particular branch of medicine called genetics. So you're a believer in a geneticist? Doesn't your head explode? Don't you know that evolution is incompatible with faith? That's what I heard from a lot of people, college your head over the cliff.

There's no hope for you now. You're going to have to give up one of these, it's not going to be pretty. And many people said that, and well-intentioned they were, and some of them went after me fairly aggressively.

How can you both defend evolution and claim that you're a believer? What really is the evidence for the theory of evolution? Is this as some are portraying a theory that is basically falling apart as we speak? Did Darwin get it wrong? And scientists are basically unwilling to admit this because they're promoting some other agenda? Well, actually the evidence for evolution, including ourselves as humans as part of that is incredibly strong. And here we are just a week away from Darwin's 200th birthday. Let me just go over a couple of the reasons why I say that.

And I can tell you, as a believer, if I had to pick the answer to this question, I'm not sure that the answer I would pick. But just to say, if God is the author of truth, and if God gave us curiosity and intelligence, and the ability to explore the nature of creation, I think God expected us to use those tools, and to celebrate our discoveries as glimpses of God's mind. And that's very much the way I view the kind of data that's coming out of the study of life forms, and they point very strongly to Darwin's theory being correct.

So for instance, we have the possibility of comparing now not only our DNA to others of our own species, but across species. And we've done a lot of that. So for instance, the first publication of a genome of a mammal, our own human genome, was followed quickly by the mouse, the chimpanzee, our closest relative, the dog, the honey bee was in there somewhere, the sea urchin, and the macaque and good heavens, even the platypus, his head is genome sequenced.

If you feed all that information into a computer and say, "Can you make sense out of this?" There's all these DNA sequences that they fit together in some way. Here's what the computer comes up with, comes up with an evolutionary tree. And interestingly, that tree matches almost to every detail.

The evolutionary trees that were constructed on the basis of the fossil record are on the basis of anatomy of these species. Interesting. Now, one could still say, and people have, that that doesn't prove that there really is to set from a common ancestor here, it could be that God created all of these species as an axo-special creation, and that God simply used motifs that were closer together in related species because they were working pretty well.

They modified a little bit, and that would give the same result. And that would be a defensible position if this was all the data you had. But as we drill down deeper into the details of DNA sequence, it's pretty clear that that won't work.

And it's also pretty clear that it won't exclude humans from the process. So let me show you one other example. And this is somewhat more a tricky one, but I think I can explain it in a fashion that you'll see it actually makes pretty good sense, and it points to a particular conclusion.

So, here are three genes that happen to reside next to each other. In humans, cows, and mice, and a lot of other mammals as well. They have funny names, EPHX2, GULO, and CLU.

And interestingly, in these three species, they're in the same order. Now that in itself kind of makes you think there might be a common ancestor going on, otherwise why would these three genes, which have totally different functions, happen to lie next to each other in these three species? But that doesn't prove that they could not have been placed there in an intentional way as a special act of creation. But I've chosen a particular interesting trio, and because the middle gene here, GULO, actually is a fascinating one from the perspective of humans, because it's a pseudo gene.

GULO in humans has a deletion of about half of its length, so that all that is left is a remnant. It could not possibly be functional. In fact, we know it's not functional.

GULO stands for Galunalactone Oxidase, and this is the final step in the synthesis of

vitamin C. You will recall that we humans need vitamin C. That's why the sailors got scurvy, is because they had a pseudo gene for GULO instead of something that worked. Cows and mice, on the other hand, don't need vitamin C. They make their own. Now, contemplate that picture for a minute.

We have here three genes in the same order, except the human one has a deletion that renders it non-functional. Can you come up with a mechanism where this would have happened if there were not a common ancestor for these three species? The only way that I think one can say that this could still be consistent with humans as a special act of divine creation would be if God placed that pseudo gene in there specifically in that location to test our faith. That doesn't seem like an attractive option at all.

That puts God in the position of being a bit of a charlatan. And everything that I think I know about God says that God is the author of truth, not of deception. That is but one example, and I could give you many others, where the details of studying the genome and its comparison to other species bring us incontrovertibly to a conclusion that we all are part of this tapestry of evolution that we are all related, and that we are descended from this common ancestor as Darwin proposed 150 years ago by gradual change over very long periods of time operated upon by natural selection.

Well, if evolution is true, and I think the science is inescapable, does that leave any room for God? This is clearly the thing that troubles the great many believers, and the reason I think where a lot of conservative churches feel necessary to deny evolution, because they were afraid the answer to this is no. But I think they've given up the field unnecessarily. There are certainly scientists out there, some of them anyway, who are using evolution as an argument against faith.

Perhaps the most prominent of those being Richard Dawkins, an incredibly gifted and articulate writer, about evolution, who has more recently become primarily an advocate for atheism in the most aggressive way. Dawkins portrays belief in a fashion that is hard to recognize for those who are serious believers, and it makes it fairly easy for him, therefore, to ridicule what believers stand for. But he also uses evolution as a club over the head of believers, saying that once Darwin came along, there was no more need to think about a creative God.

Well, Dawkins has basically made a category error. If God has any meaning, unless you're a pantheist, God is at least in part outside of nature. Science is entitled to make statements about nature, and science is pretty good at getting answers about nature.

But science has to remain silent about anything that falls outside of the natural realm, which means that science can never be used as an argument to discount God, and evolution, while it's an interesting observation, cannot in itself make much of a statement about whether there's a creator behind it. And so Dawkins essentially is committing the kind of dogmatic problem that Chesterton pointed out, atheism being the

most daring of all dogmas, for it is the assertion of a universal negative. And so fundamentalism has found its way in atheism in the same way it's found its way in the belief.

Well, if you want to read more about this discussion about God versus science, there was a debate that I had with Dawkins in front of the editors of Time magazine, and it's still up on the web if you just Google, and you will see there the case that Dawkins puts forward about why science is entitled to pass judgment, and my counter to why that is not the appropriate direction to go. Interestingly, at the end of that debate, after many negative statements, Dawkins did have to state that he could not completely exclude the possibility of a supernatural being, because after all, there was no tools available through science to exclude that. But he said, if that supernatural being were to exist, it would be so grand and awesome that it would be unlike anything that you believers have believed in.

[laughter] I think there was a conversion right there. [laughter] So that revealed, I think, the disconnect between Dawkins' sense of what believers imagine of the awesome nature of God, and the way he writes about it in his books. So atheism, essentially, won't do.

It is the denial of the existence of something for which you have no right to make that statement, because we don't have the tools to do so. Agnosticism is a more principled position, but many agnostics have arrived at that position as I did simply because they don't want to think about it, and not because they've actually considered the evidence. Well, if evolution is true, how can it be reconciled with faith? And here is the answer that I have found, in which I, after talking to many scientists who are believers, realize that many of them have arrived at as well, without really having the sense that many others have traveled that same path before them.

It's very simple. Almighty God, who is not limited in space or time, created a universe 13.7 billion years ago, with its parameters precisely tuned to allow the development of complexity over long periods of time, all intention. That plan included the mechanism of evolution, to create this marvelous diversity of living things on our planet, and who were we to say that was a clumsy method? It was an incredibly elegant method, and most especially that creative plan included human beings.

So after evolution had prepared a sufficiently advanced house that beat the human brain, then God gifted humanity with the knowledge of good and evil, the moral law, which I would argue still defies a completely evolutionary explanation, with free will and with an immortal soul. We humans, and this is what you read about in the Garden of Eden, used our free will to break the moral law as a result, becoming estranged from God. For Christians, Jesus is the solution to that, the stranger.

Now there's nothing in that synthesis that I find to be inconsistent with what I read in the

Bible and what I know as a scientist. And this is often referred to as theistic evolution. I'm not crazy about the term.

It relegates theistic to the adjective, and evolution is the noun, and a lot of people aren't quite sure what a theist is anyway. So maybe we need a better description of what this point of view is, this effort to put together in a harmonious way, the truths of science and the truths of faith. So what we're really talking about here is bio-s life through logos, the word as in the first chapter of John in the beginning was the word.

God speaking life into beings, speaking us into beings, or we could simply call this bio-logos. Now objections to this have certainly been raised, and here are a couple of the familiar ones. Didn't evolution take an awfully long time.

That seems like such an inefficient process. Well remember God is outside of time. It might seem long to us could be a blink of an eye to the Almighty.

His evolution are purely random process. Doesn't that take God out of it? Simon Conway Morris has written beautifully about this to point out the fact that evolution seems to have a certain inevitability. The eye for instance has appeared in evolution no less than seven times independently.

And it would seem Conway Morris would argue that large-brained animals of some sort were inevitable. Whether they had to look exactly like us, whether they would turn out to be hairless primates, maybe not. But is that the point? Does in his image require the idea that we look like we look like? Or was the point in terms of having a brain and intellect mind the opportunity for free will, the moral law and the soul to enter? So maybe that is not an objection that we should take too seriously.

And of course also the random process, remember that's because we're limited by time, where yesterday comes before today, which comes before tomorrow, if you're God and you're outside of time, something that appears random to us may be precisely defined. So I don't think this objection actually is a problem. Here's the objection coming from the Intelligent Design Movement, ID, argues that there are aspects of certain nano-lachines that exist within cells, hours and other species that evolution could not account for because they're just too complicated.

They have too many working parts. And the evolutionary pressure, while it might be able to generate one part, the idea that you have to generate 30 some of them to make a bacterial flagellum and until you have the whole thing together, you get no advantage. Seems like a mathematical issue that cries out for some explanation.

And that's been an interesting argument, but I think it's fair to say that the ID positions are beginning to crumble. In the sense that, as we learn more and more about the complexity of things like the flagellum, you can see that they were actually derived

stepwise, not all ones out of nothingness, and that they basically were recruiting other proteins that were doing other things in a process that's entirely consistent with gradual change in natural selection. And so while ID has embraced by many people in the church because it seemed to be a way of fighting back against what they perceived as godless evolution, I fear that ID has been a dead end.

And in the process of embracing it, the church has also found itself attached to a particular perspective that scientifically is showing severe cracks. And it's an unnecessary embrace, because again, I think it is not required of one to say that evolution needs God to keep stepping in and fixing it. A more awesome god could of course get right the first time and wouldn't have to do all of that tinkering along the way.

But of course the major objection that I think particularly in the United States, conservative believers would raise about this perspective is that it conflicts with the Bible, and particularly with Genesis 1. And here I think it's worth looking back over history to try to see what it is that thoughtful, deep thinkers, sincere believers have tried to make the words in Genesis 1 and 2. There are after all two creation stories in Genesis 1 and 2, and they don't quite agree with each other. And I think that was supposed to be a clue that we should not insist on absolute literality because already you've got a problem because you have two stories that differ in the order of events. And furthermore, the language in Genesis 1 and 2 does not suggest that the author was attempting to write a scientific treatise, but rather to teach us something about the nature of God and the nature of humans.

And so when someone says to you that in fact evolution can't be true because it's not consistent with those words in Genesis, I would really ask that they look back at words that have been written 1600 years ago by the person I admire most in terms of thoughtful reflections on Genesis. And that's St. Augustine, who wrote no lesson four books about this topic, and concluded in a paragraph or two that really ought to be reread frequently these days, the following, "In matters that are so obscure and far beyond our vision, we find in Holy Scripture passages which can be interpreted in very different ways without prejudice to the faith we have received. And he's writing specifically about Genesis.

In such cases we should not rush in headlong and so firmly take our stand on one side that have further progress in the search for truth, like science. Justly undermines this position we too fall with it, what a prescient morning. The insistence on the literal interpretation of Genesis is largely a position taken in the last 150 years.

The biblical text has not changed for many centuries. Isn't it ironic therefore that just at the point where we have such strong evidence coming from science about the age of the universe, the age of the earth, and the relatedness of living thanks to revolution, that the church has chosen to adopt a position that is utterly in conflict with those observations,

and in the process has created great turmoil. I got an email today that I read on the plane coming down here from a student at a university in the northern part of this country.

In absolute crisis. He had been raised in a conservative church, homeschooled, and now is off at university. He has learned for the first time that the evidence about the age of the earth and about evolution is extremely compelling.

His great distress is the fear that if the church was wrong about those issues, maybe they were also wrong about the whole thing. He feels the ice cracking under his feet and fears that he's headed downward to loss of his face. I get emails like that a couple times a week.

This was particularly poignant ones because you could just feel the stress in this young man's writing. What an unnecessary tragedy. Because this perspective, this narrow view, which excludes the possibility of finding harmony between science and faith, and insists that you have to choose one or the other, is not one that I think is sustainable.

It is heartbreaking to see people going through that kind of distress as an adult. If you want to read more about this perspective, I'll give you three books that you might look at. My own, but in the middle there is Darrell Fox book called Coming to Peace with Science.

A wonderful book by a master teacher in biology, saving Darwin, Carl Givers and a physicist writing about the harmony of science and faith. For those of you who are interested in actually getting involved in an organization or scientists who are believers share their experiences with each other, the American scientific affiliation provides that. I've been a member for more than 30 years and it has been a wonderful source of consistent reinforcement with like-minded colleagues.

So there are resources out there. I hope that in the coming years we can begin to recognize that the extremists have had the stage a little too long and that the great mass of people who find joy in the harmony between science and faith can be heard from a little more and can spread the word that you don't have to make a choice between these worldviews. You can in fact put them together and have them coexist quite happily without any explosions whatsoever.

Thank you all very much. At this point Dr. Collins will be happy to answer some questions. Can you explain a little bit about your useful complexity? Especially to selling over the level and how that fits or doesn't fit with evolution.

Thanks. So where we do this for complexity is this term that was introduced particularly by Michael Behey and William Demsky, a couple of the leaders of the intelligent design community. Basically the idea is that there are these structures and the bacterial

flagellum is one that I mentioned but the eye has also been pointed to or the back of the clotting cascade that allows your blood to clot that have a lot of protein components.

And if you knock out one of those components, the thing stops working. So it is a little mysterious then. How did it ever get started to work? You have all of these pieces and it looks as if it's a rather fragile situation that you'd have to have all of the pieces together before you achieve any benefits.

And that's the argument that the complexity cannot be reduced. The argument when you look more closely though is in serious trouble. With each one of those examples when you look at those components you can see and other organisms along the way that they had other properties.

So the bacterial flagellum for instance, the components of this and other species are used as a different kind of function. So called type 3 secretory apparatus. And then you can begin to see how something as fancy as this outdoor motor called the flagellum came together in a stepwise fashion by this recruitment.

And then the complexity is not a reducible after all. And if it's not a reducible and it's no longer a problem for evolution to account for. And that's why I say I think the intelligent design movement has had its day, has caused a lot of people to think.

But unfortunately, it's really seen I think such serious cracks as to no longer be a viable alternative. And yet, despite the fact that I think scientifically it's very difficult to find people who are trained in deep evolutionary biology who are comfortable with ID. It continues to be embraced by many people in the church.

Again, because of the sense that it is a way to fight back against godless materialism. An unfortunate situation and one which ultimately I think we've got to get straightened down. Okay, over this side.

Oh yeah, an important part of like the whole salvation story is always the fall of man. So my question has to do with how do you reconcile the evolutionary history of man with that part of the salvation story, particularly with the creation of man and god's image and then the fall from the fall of man in descent. You need my 33 frequently asked questions right now because a lot of them come to this question.

Well, okay, so what's special about humans? You could, I think, make a few interesting characteristics and say they don't seem to be represented in the same way in other animals. And one of them is this moral law. Another seems to be the full exercise of free will.

It seems to me entirely plausible to put forward a model where evolution develops the complexity of the brain sufficiently to become a place where such concepts of morality and free will would have a home where you have enough neurological capability to

achieve that. But I don't know that that is the whole story. The story of God's contribution here is very much played out, I think in mostly allegorical ways, in the Garden of Eden with the idea that we have humans now having arrived on the scene, achieved this free will and being given some sense of the moral law and then eating using their free will, the the tree of the knowledge of good and evil realizing now fully that they have broken the moral law and immediately feeling the separation from God.

And that is the fall, of course. And the penalty of that was separation from God and spiritual death. I'm sure there's going to be other people raising.

Wait a minute, was there death before the fall? And would you have another conversation about that? I think it's possible to put those descriptions from Genesis together with the evolutionary history of humans together in a fashion that fits pretty well. But I would be the last one to say, I can say exactly how that fits. I can give you three or four options of how it fits and any one of those might explain it.

Okay, over the other side. I like your explanation of physics and your dating, but I was wondering how plausible it would be that the laws of physics would change or whether they're soon to be constant and whether they have to be constantly within your system. I guess we have not observed them to change and it would be fairly radical to suggest that they have.

Now let me, Haysle, to say we don't know what happened in the first 10 to the minus 42 seconds after the big bang where the laws of physics break down. And so I have no idea what went on there. But ever since that first blank second, as far as we have the ability to observe, the laws of physics have not altered it.

And that seems therefore like the default conclusion once you draw. That means that if you're trying to explain the age of the earth by altering those laws of physics saying for instance that half lives have changed, that is a pretty radical proposal. And I would be cautious for those who have embraced that to realize if you are getting into territory, it would be pretty hard to back up by evidence.

Okay, great. Over here. Hi, I'd like to say thanks for coming out of your speech.

Very lightning. Thank you. In your scientific experience, would you suggest that it would be a good idea to start maybe considering the possibility of other invisible things such as I'm really interested in leprechauns.

And how the scientific, you know, a very scientific idea of the Occam's razor should lead us maybe more towards believing in a dead guy 2000 years ago who convinced people that he was the son of God rather than leprechauns. Could you? Sure. I appreciate the provocative question.

The evidence for Jesus Christ existence on the planet is probably at least as good as the

evidence that Julius Caesar existed. We have that not just for biblical sources, but from historians who wrote it at the same time like Josephus. That was all news to be, by the way.

I was first exploring religion. I assume Christ was a myth just like the leprechauns, but the history there is extremely compelling. Now, the history also says that something amazing happened, but the tomb was empty.

And that, of course, is a very difficult thing for a scientist to believe. But if you go back again and look both for biblical and non-biblical sources at the evidence for the resurrection, it is surprisingly strong. And he writes book, "The Resurrection of the Son of God," which goes on for some 700 pages, will tell you all of these bits of evidence.

And I think is worth looking at if you're serious about trying to investigate the historical basis of the claims of Christianity. So, sort of placing that body of evidence over against leprechauns, I think it's pretty clear. You should go with Jesus.

Thank you. You've mentioned the creation and the resurrection as a couple of outstanding things. I wondered if you would comment on something also that was supernatural and how it might fit in with your endeavors.

What would Jesus' genome look like? And I'm saying, like, methodologically, where would you start with that? So that's what Colbert was suggesting. We should get to the Shraddam-Taran and get some DNA off there and answer your question. I think Tipler said that too.

So, I don't know. It seems to me, if you're willing to go to the idea that Jesus was, in fact, both human and divine, that it would not have been a problem for God to figure out how to work that out at the DNA level. But if you want to be completely reducing this to the point of probably ridiculous practicality, you and I suppose say that Jesus had a one genome that was human and another that was divine.

And by the way, that means that sinfulness must be recessive and divinity must be balanced. All right. Question from over on the side now.

Hello, thank you for being here. One of the most difficult things for me in my faith is seeing bad things happen to get people in just chaos in the world. How do you explain that? I mean, why isn't the universe tuned in that way? Let's say, give it up.

So, I think that's the most difficult question that believers ask. If God is good and God is all powerful, why do God's people suffer? You would think God wouldn't have set it up that way. And I think deep thinkers have wrestled with this from Dietrich Bonhoeffer to see if Lewis is a wonderful book called The Problem of Pain.

And there are some answers. They're not easy answers. First of all, I think we should say

that for the universe and for our part of it to have meaning, the concept of free will seems pretty important.

If we did not have free will, this would all be a robotic society and it wouldn't seem to be in a human or divine point to it. Now that we're given free will, we use it in ways that cause other people to suffer. And that's a source of a great deal of the suffering that we see around us, is things that we do to each other or do to ourselves.

But that's not the whole story. How do you explain the childhood cancer? How do you explain the people who die in an earthquake? How do you explain all the terrible tragedy here in the world, so I would continue. Now some might say, well it's our own fault because we build houses where the earthquakes and we build cities where there are hurricanes.

But that seems a little bit too easy to dismiss the whole thing. Part of the answer might just be in the circumstance of considering what God's plan is for our lives. And that maybe God's plan is not best served by our living a life that is completely devoid of any kind of suffering.

I don't like that answer, but I know it's true in my own life. But the times where things are going really smoothly, sometimes I don't learn a thing. When I put into a difficult situation and go through some suffering, then somehow I learn a lot more about God and about myself.

And maybe that's the point. Louis' wonderful phrase about this, that God whispers in the good times. Shouts.

[Laughter] [Laughter] I hardly know where to go from that God. Yeah, God uses a megaphone when things aren't going so well. And maybe the other part of this is that we should think of ourselves not just as creatures who are here in this earthly timeframe, but on a broader timeframe.

And in that sense, things that may make no sense to us, we will someday see and make a great deal of sense from the perspective of eternity. Okay, over here. First of all, I'd just like to make your big hair and the work you've done with the Enochino project.

I think it's really amazing. It seems like this talk is focused on reconciling faith with science. Beyond that reconciliation, don't you think there's something science can teach us about what God wants for us in our lives, especially as your work is a genesis? I'd be interested to know where you see that.

Where you see that. I'm not sure I could necessarily agree with that. It seems to me science by its nature, again, focused on the material world may not be a good lens to try to see what God's purposes are for us.

It seems to me God's purposes for us are found by other means, by prayer, by reflection on the moral lot, what we're called to do as a result of that, by building relationship through joining together with others and trying to seek God's world. Science can help us avoid potholes by giving us truths about how the world works, giving us information we might need in order to do a better job of perceiving where God is calling us to be. But I'm not sure science directly is going to give the insight that we most need of what it is that God is calling each one of us to accomplish.

Okay. Next question. How do you do? Maybe you can tell me the name of someone or some group that is working on the ethics of genetics.

Now that the genome is out in the think that this generation would be a great time to work out some sort of Bill of Rights for the way human beings are now. Yes. So that in the future, once the diseases are solved and all this good stuff happens, there won't be the temptation to use all this that we just have discovered.

First up, for any other person. So that is something that all of us working in the field have been concerned about, especially as this accelerating pace of discovery is threatening to get a little ahead of society's involvement and making those kinds of decisions about where the boundaries are. The human genome projects set a new standard here by defining an ethical legal and social implications program as part of the project in which we invested a substantial amount of the budget.

And that resulted in the coming together of a cohort of ethicists and lawyers and theologians and social scientists and others to work on these problems and try not to end up in the circumstance which all too often has happened where all of a sudden there's a crisis and people go why did we think about that? I think we have a pretty good sense of what some of those challenges might be in at least a couple of instances evidence that that's been very useful such as the passage of the genetic information or discrimination act last May, which says that your DNA information can't be used against you in life insurance and health insurance or in the workplace. And that was a pretty big step forward. But there are many other issues and enhancement is one that many people are worried about.

It's great to treat a terrible disease but we want to take normality and make it even better and who decides what's better and who gets access to that. Many of those issues yet to come that science will make gradually possible. And I think we need to be vigilant as a society to think about those issues and not just assume that somebody else is taking care of.

I think the mechanism is there to do that. It's going to require participation by people across many different particular perspectives in order to achieve some kind of consensus. I think we can get there but we have to pay close attention.

And again has passed a wonderful document, a declaration on the genome and human rights, which sums up a lot of the issues that need attention and which was embraced by many many countries. So that would be a place to start. I'm a scientist here at Tinglaning on scientists.

And one of the things that I know is that you can grow a macrophyse or a microglia, change its environment and it will change the perceptions of small things that will be harder. You can measure the evolution in the dish if it happens. But it seems to me that the absence of evidence is not evidence of absence when it comes to faith.

What evidence is there for faith that's measurable? So it depends on what your standard is for evidence. I think if you apply a scientific standard to faith, then you've got a category problem. And I know that sounds like I'm dodging the question but I think it's the honest truth.

That faith by definition is in fact the evidence of things not seen, which means they're not like the microglia or the macrophyse if you're going to observe. And nobody will be able to provide the evidence for faith that will be convincing to somebody who is absolutely determined to remain skeptical. I know that because that was a position I was here.

But I hope I've gone through and there's more in the books that I showed to you. And arguments that make faith seem intensely plausible. And that is probably as far as you're going to go on a purely rational basis.

At some point, faith has to involve not just your head, which are hard. That hard part, which I think I talked about a little bit in terms of this sense of longing to be part of something, which is a sense that there is something out there that's bigger than basically reading the DNA sequences or studying the natural world. Ultimately, it becomes a very important part of humanity.

Science is great at answering the questions about how. But science is often powerless to answer the questions about why. And either you have to decide those are inappropriate questions or find some other pathway towards them.

And that provides that pathway, even though it doesn't come with the same standard of proof. That's just the nature of how things are. I respect your question deeply.

If faith were possible to prove in the way that science can prove, we would all be believers in one continual growing and developing and uniform faith. And clearly that wasn't God's plan. Instead, he put some kind of ambiguity in all this and left it up to us to figure that out.

Okay, great. We have about ten more minutes for questions. So, I'm trying to get as many as possible over here.

Hi, Dr. Collins. I want to thank you for your very provocative talk this evening about the reality is discussions of this type are almost impossible to have in the public schools these days in large parts thanks to the advocacy of members of the scientific community. Why do you believe the scientific community, or so many in it, are threatened by discussions of this type? Well, I'm not sure all are.

40% of working scientists are believers who I think would be very comfortable with this discussion, but probably be very glad to hear it was happening, would have some different perspectives and what you've heard from me, but would generally agree. It's a good thing to talk about this. But I do think scientists have a point that if you're going to have those discussions in the public schools, they ought to be in the context of a worldview kind of conversation and not be injected into science class.

Science class ought to be the place where you talk about the tools of science to understand the natural world and to mix and mingle that with other perspectives that are not science runs the risk, I think, of diluting the topic and potentially confusing students. I would be very comfortable with the assertion that our public schools ought to provide an opportunity to have a conversation, but not in science class, find the appropriate venue for that to happen. Okay, great.

Next, I'd like to thank you first of all, Dr. Collins for coming on a big fan of your Human Genome Project. But I take kind of a non-attent, I have a phone check and it comes from a couple of quotes from Plato and it's "Does God command it because it is right or is it right because God commands it?" Now, this goes in direct contrast with morality from God in that if the Abraham and God is three things, all knowing, all loving and all powerful. If he commands it because it is right, that means he's following some kind of other morality which makes him not all powerful, or if he commands it or is right because he commands it and he's arbitrary which makes it not all good simply arbitrary.

And the question is how do you reconcile the problem Plato's problem with the morality of God? So, this morality question comes up a lot of these conversations we didn't get as deeply into it as we might. Where does morality come from? And that's part of what Plato's reflection is. Is it a creation of God or is it not? Or is it a creation of evolution? If you're a ardent evolutionist who's going to say that the world law is in fact completely a construct of evolutionary pressures, then you have to take that all the way to its complete conclusion, which is to say that right and wrong are in fact an illusion.

That we've had them drummed into our brains by the evolutionary process but they don't really have any meaning. And that is a very awkward and uncomfortable place to go. And I haven't heard too many atheists who really want to take that conclusion on very seriously because that seems so anomalous.

If you're an atheist, does that mean you can't call religion evil anymore because there's no such thing as evil? It sort of seems like you're caught on that. But I think morality has

its strongest basis if you're a believer because then you don't say this is purely an evolutionary artifact. You're saying there is something fundamental here.

But does God have to be either driven by morality or be the author of morality that seems to be God and morality? God and holiness are one and the same. And then what Plato's argument is I understood them. I'm not a philosopher.

It seemed to be forcing the idea that God and morality had to be separate in some way. Why could they not be all one part of one thing? Next question. I'd like to thank you for being here.

But on a personal level, once you had concluded that there was an almighty being, amongst all the other religions, what brought you to Christianity and what proofs did you derive being mental acts that Christianity said? Yes. And I know this is a sensitive question and many people find Christians to be very narrow, by the way, in which they portray the truth that they have found in a fashion that makes other people feel not very welcome if they take a different view. I want to make that mistake.

I guess, again, I looked across the various faiths and I did find a great deal in common and I therefore have great respect for the alternatives. But the personal price was what really caught my attention and ultimately drew me in because of this remarkable, unique character who not just claimed to know something about God but claimed to be God. And also made all these marvelous reflections upon how we should live our lives in a way that seemed to be profoundly radical for the time.

And there's, again, going back to Lewis, a famous paragraph where Lewis really caught me up short by saying, "You can say a number of things about Christ, but the one thing you cannot say is that he was a great moral teacher, but he wasn't divine. Because he claimed to be divine. And someone who claims to be divine is either crazy or evil or what he said he was.

And you can't dismiss him as simply a moral teacher and forget all that other stuff. You're not given that choice. Christ didn't intend for us to have that choice.

Wow. That was a pretty tough one to walk past. And ultimately, it made sense to me, especially as I learned more about the historical basis for this, to consider this as the truth.

And that is where I got to at age 27. That's where I end today. If you like this and you want to hear more, like, share, review, and subscribe to this podcast.

And from all of us here at the Veritas Forum, thank you.

(gentle music)

(buzzing)