



‘The Friendship of Science and Religion’

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In the name of God, Father, Son and Holy Spirit. Amen.

I take my text this evening from the book of Job, from a passage a little earlier than the one which was read this evening. The twentieth verse of the twenty eighth chapter, ‘Whence comes wisdom, and where is the place of understanding?’ (*Job* 28.20). And I would like to start by asking a second question: why do people do research in science? It’s hard work, it has its fair share of frustrations – as the good ideas of the morning prove less persuasive in the cold light of the afternoon. Like all worthwhile activities it has its fair share of wearisome routine. So why do we do it?

We do it because we want to understand the world, and of course science has been stunningly successful in helping us understand certain aspects of the reality within which we live. But if you have that thirst for understanding, as I’m sure you do, I think you will not find that it is quenched by science alone. And the reason is that science has purchased its very great success by the modesty of its ambition. It only seeks a certain kind of understanding – to understand the processes by which things happen in the world – and it brackets out other questions – whether there is value or purpose in what is going on. And that means that its view is limited.

You can get the point by thinking what science could tell you, as science, about music. Well I guess the answer would be that it would be a neural response, various things going on in our brains, to the impact of sound waves on the eardrum. And of course that’s true, and in its own way it’s worth knowing, but it hardly exhausts the mystery of music, or so it seems to me. How does it come about that a temporal sequence of sounds can speak to us, and speak to us I think truly of a timeless realm of beauty? The truth is it seems to me that science trawls experience with a coarse-grain net, and many things of the greatest interest and importance slip through the wide meshes of that net.

Moreover, it seems to me, that the understanding that science gives to us in itself point beyond itself. I want to spend a little time talking about two ‘meta-questions’ as one might call them; questions that arise from our experience of doing science but which are not scientific questions in themselves and so cannot be expected to receive scientific answers. And the first of those questions is extremely simple, in fact so simple that most of the time we don’t stop to think about it. And it is simply this: why is science possible at all?

Well, you might say evolutionary necessity explains that our brains must have been shaped to make sense of everyday experience – and of course that’s obviously right. If we couldn’t figure out it’s a bad thing to step off the top of a high cliff, we might not be around for very long. But something quite different happens when somebody like Isaac Newton comes along, and, with an astonishing leap of the human imagination, is able to see that the same force that makes the high cliff dangerous is also the force that holds the moon in its orbit around the earth, and the earth in its orbit around the sun; and is able to discover the mathematically-beautiful universal inverse-square law of gravity, and in terms of that is able to explain the behaviour of the whole solar system. That seems to me to go far beyond anything that we need for everyday survival or could be thought to be some happy accidental spin-off from everyday necessities.

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You may remember when Sherlock Holmes and Dr Watson first meet, Holmes pretends not to know whether the earth goes round the sun or the sun goes round the earth. And of course the good Doctor is horrified at this apparent ignorance on the part of the great detective, and Holmes simply says ‘What does it matter for my daily work as a detective?’ – and of course it doesn’t matter at all. But we all know many things that we don’t need for everyday living, and we’re able to think about those things in ways that are quite different from the ways we think about everyday occurrences. I worked in quantum physics all my scientific life, and in the quantum world if you know where something is don’t know what it’s doing, and if you know what it’s doing you don’t know where it is – that’s Heisenberg’s ‘Uncertainty Principle’; the world is cloudy and fitful and we have to think about it in a quite counter-intuitive way, in a quite different way to the way in which we think about everyday events.

Nevertheless, we are able to understand that world, and the mystery of that is deeper still, because it turns out that it is mathematics, mathematics which is the key to unlock the secrets, the deepest secrets of the physical universe. It’s an actual technique in fundamental physics to seek theories which are expressed in terms of beautiful equations. Those of us who speak the language of mathematics can recognise mathematical beauty and, importantly, we can agree about mathematical beauty. It’s a rather austere form of aesthetic pleasure but it’s a real one, and it involves qualities like economy and elegance and so on, and we can agree about that. And we have found the three-hundred-year history of modern theoretical physics have shown us that the fundamental equations of nature are always expressed in terms of beautiful equations. Nobody knew that better than Paul Dirac, Fellow of this College, Lucasian Professor for more than thirty years in the University, one of the founding figures of quantum theory, and unquestionably the greatest British theoretical physicist of the twentieth century. Dirac made his great discoveries by a relentless and life-long and highly successful quest for mathematical beauty. In fact he once said, “It is more important to have beauty in your equations than to have them fit experiment”. Now of course he didn’t mean by that that at the end of the day empirical adequacy wouldn’t matter – no scientist could think that – but what he meant was this: You have your new theory, it doesn’t quite fit the facts. That of course is a setback, but it isn’t necessarily absolutely fatal. Almost certainly you will have solved the equations in some approximation, and maybe you made the wrong approximation. Or maybe the experiments are wrong – we’ve known that happen more than once in physics. So there was at least some residual hope. But if your equations were ugly, then in Dirac’s opinion there was no hope; they couldn’t possibly be describing nature.

Dirac had a brother-in-law, Eugene Wigner, who was also a Nobel Prize winner for physics, and Wigner once said, “Why is mathematics so unreasonably effective?” Why is it the key to unlocking the secrets of the universe? After all, what is mathematics? It’s abstract human thinking. Our mathematical friends sit in their studies and out of their heads they dream up the beautiful patterns of pure mathematics. And what we have found is that some of the most beautiful of those patterns actually occur, are instantiated in the structure of the world around us. So what could it be that links together the reason within (the mathematical force of our minds) and the reason without (the order of the world)? Wigner said the unreasonable effectiveness of mathematics was a gift that we neither understood nor deserved. Well, I don’t know whether we deserve it or not, but I would certainly like to understand it.

So why is science possible? Why is mathematics so unreasonably effective? Now, a deep question like that will not have a lock-down answer, but the most coherent and intellectually satisfying answer to me is this: that the reason within and the reason without fit together because they have a common origin in the mind of the God who is the creator of this world and whose will and purpose is the ground both of our mental experience and of the physical world of which we are a part.

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You can summarise what I've said so far by saying that science, as it explores the physical world, finds it a world shot through in its rational beauty and rational transparency, shot through with signs of mind, and I suggest that it is worth considering whether a capital M "Mind" of the Creator is lying behind that wonderful order. So that would be an example in which a question arising from science in my view finds a satisfying – a coherent and intellectually satisfying – answer from religious belief.

Let me ask just one other question: why is the universe so special? Now, we don't like things to be special in science; we like things on the whole to be general, and I think the instinct of most of us would have been to expect that our universe is just a common or garden specimen of what a universe might be like. But the more we've understood the extraordinary sequence of processes which over 13.7 billion years have turned what was originally a ball of energy into the home of saints and scientists, the more we understand that, we see that the potentiality for that amazing history was present in the physical fabric of the world from the start. It is only a very special universe indeed, a finely-tuned universe one might dare to say, whose laws of nature are such as to permit the development of carbon-based life – a very unexpected and surprising discovery, but also I think clearly a significant discovery.

Somebody who played an absolutely vital part in figuring out how carbon is made, in fact how all the heavy elements are made, was Fred Hoyle – also a Fellow of this College. Carbon is not made in the early universe – it's too complicated for that – and the only place where carbon is made is in the interior nuclear furnaces of the stars. Every atom of carbon in your body was once inside a star; we are creatures of stardust. And Fred and his associates worked out the extraordinary beautiful and delicate process by which carbon and elements heavier than carbon are made within the stars. I don't have time to describe that this evening but he was very struck by the fact that the making of carbon itself is only possible because there is a very delicate balance in the nuclear forces; there is an essential enhancement effect or "resonance" as we say in the trade, which occurs in just the right energy to make the process possible. If the nuclear forces were just a little bit different there would be no carbon and we wouldn't be here this evening.

Now Fred had a lifelong commitment to atheism, but when he noticed this extraordinary fact that the laws of nature were fine-tuned to make carbon possible, he is reported to have said (in a Yorkshire accent that it is beyond my powers to imitate), "the universe is a put-up job". This remarkable fine-tuning can't be just a happy accident, and because Fred doesn't like the word 'God' he says some capital I "Intelligence" must have "monkeyed with the laws of nature" to make this possible. Well, I don't think that's the best way of putting it; I would say that the universe we live in is special, it is not just any old world, precisely because it is a creation which has been endowed by its creator with those finely-tuned laws and circumstances which have enabled it to have so fruitful a history.

So you see, I think science and religion are friends and not foes. I think that I need both, I think they complement each other rather than being in conflict with each other. We have every reason to believe that scientifically stateable questions will receive scientifically stateable answers. Science requires no augmentation from theology in its own domain. But science's domain is too limited to be wholly satisfying. If we want to understand the world through and through as widely and deeply as we can I think we need the complementary insights of religion, and I've just tried to sketch two examples of how I think that works.

Now the final thing I have to say is this: suppose you find the arguments I've sought to present this evening wholly persuasive. If you do it will lead you to some notion of God, but a very limited notion of God. It will give you a picture of God as, if you like, the great mathematician or the cosmic architect. And of course, that's part of the

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truth, I think, but it's not the whole truth. And it certainly doesn't tell us for example about whether the God whose mind is behind the wonderful order of the cosmos is also a God who cares for individual people. You know, Einstein had a sort of cosmic religiosity; when he made his great discovery of general relativity he said he felt like a child in the presence of the elders, and he liked to talk about God whom he referred to usually as 'the Old One'. But he also said he didn't believe in a personal God; he rejected that. And of course he wasn't looking in the right direction if he was going to find that – you won't find a personal God by simply looking at the vast structure of the universe. And the second reading we had this evening, from *Colossians* provides the Christian answer to how we find out what God is like. It makes the astonishing claim of the cosmic significance of Christ, it speaks of Christ as the one in whom all things hold together, the one who is the first-born from the dead, the one who redeems all things by the blood of his cross (*Col.* 1.16–20). Christ is seen as being significant for the whole history and future and fulfilment of the world in which we live. So for the Christian, if you want to ask the question, 'Does God care?', then you look and ask whether Christ cared for those people in need who crossed his path.

At the heart of Christianity lies the astonishing, mysterious, and I actually believe true, belief that the invisible, powerful God, the great cosmic architect or great mathematician has acted to make God's nature known in the clearest possible way, a most accessible way, by living a life in Jesus Christ. So for me, religious belief and scientific insight complement each other in a deeply intellectually satisfying way. I often say I want to be two-eyed: I look at the world with the eye of science and I look at the world with the eye of religion, and I believe that that binocular vision enables me to see more than I could with either eye on its own.

So I want to end again with a quotation from the *Book of Job*, "Behold, the fear of the Lord, that is wisdom; and to depart from evil, is understanding" (*Job* 28.28).

Amen.